The Electrical Industry's Weekly Magazine

February 17, 1958

Electrical World

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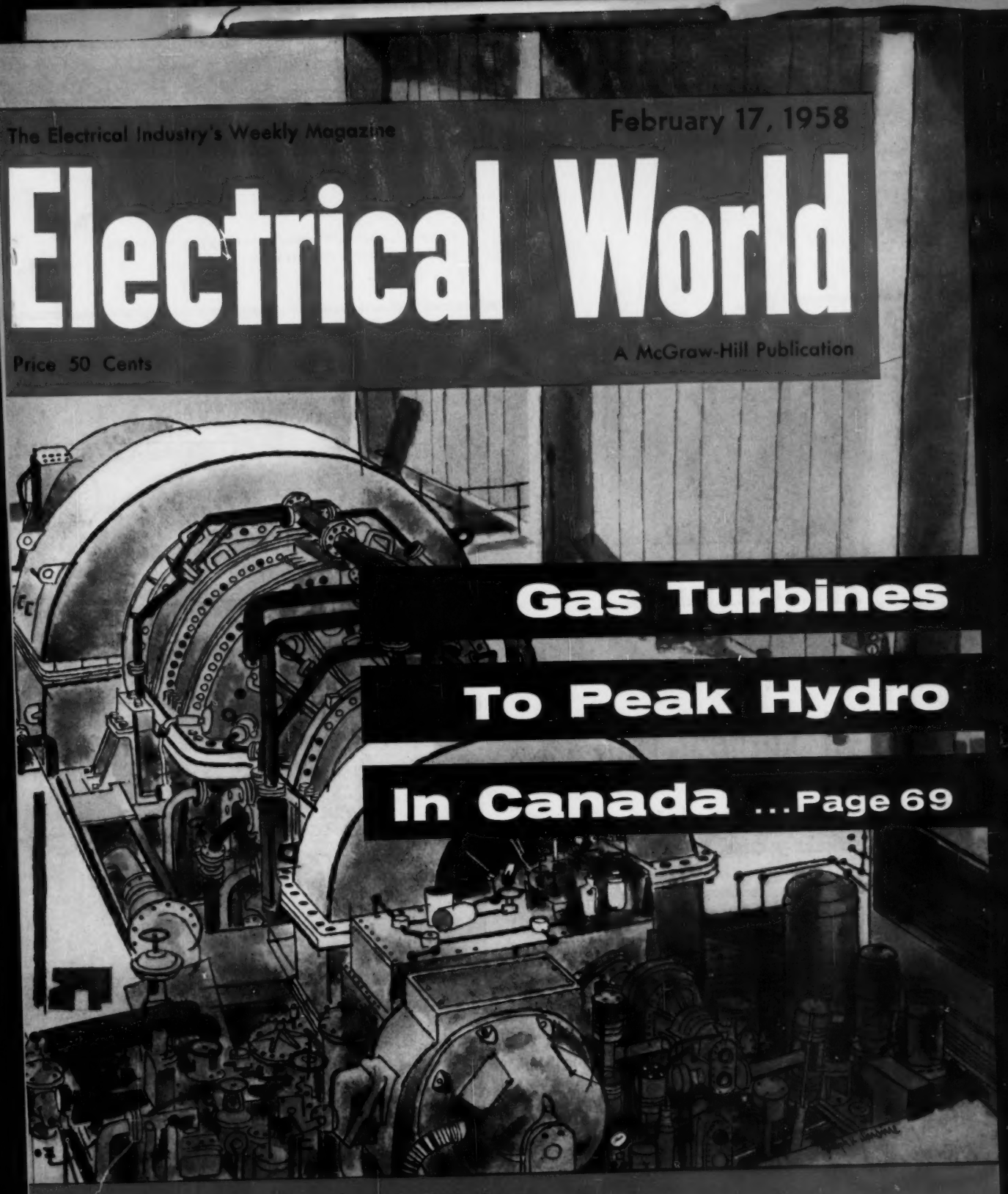

Gas Turbines To Peak Hydro In Canada

...Page 69

Here's the AIEE, as Seen Through the Eyes of Presidential Nominee L. F. Hickernell . . . p 64

E B POWER GS W 1
UNIVERSITY MICROFILMS IN
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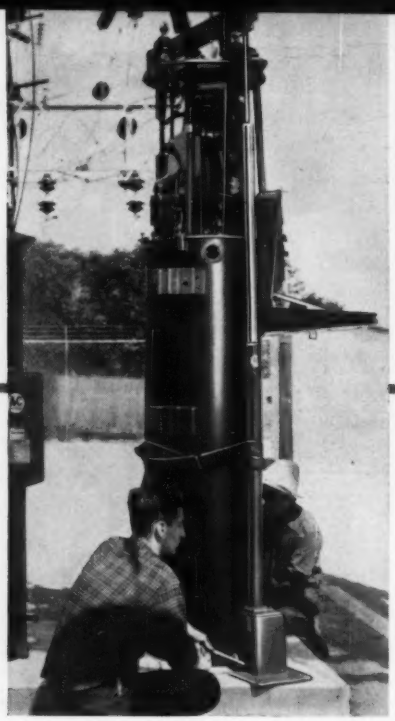


Convenient, easy-to-use hydraulic untanking jacks are available to all Allis-Chalmers regulator users.

Mobile unit carries all needed tools and repair parts. Oil storage tank, filter press and dielectric oil tester are in trailer.

ALLIS-CHALMERS

NEW Field Service Unit

combines regulator training and service

Mobile service unit brings trained service personnel and instruction on preventive maintenance to regulator site.

THIS mobile unit has proved to a growing list of utilities the economy of preventive maintenance on a planned program.

Utilities are encouraged to have their own men participate for training.

The service includes detailed inspection of mechanism, checking band width, voltage level, and relay contacts, retouching paint, replacing parts and filtering oil if necessary . . . thus extending regulator life . . . eliminating potential troubles.

All service, whether for single or three-phase regulators, is done at the regulator site. Full advantage is taken of *unit construction* of Allis-Chalmers regulators. Downtime is reduced.

See New Movie

Additional information in colored 16-mm sound film can be obtained by contacting your nearest A-C office or writing Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

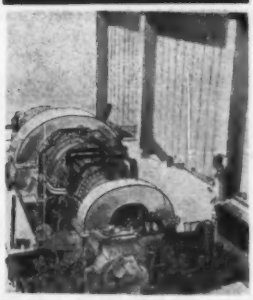
A-5584

Electrical World

Vol. 149, No. 7 FEBRUARY 17, 1958

Published for 84 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue



CURRENT EVENTS

Hickernell Looks at the AIEE

He sees the big professional organization as a "blend of two philosophies" that meet membership's varied needs...p 64

AIEE Winter General Meeting Opens

Broad range of subjects discussed, including proposal that federal government subsidize education.....p 62

GENERATION

Gas Turbines Peak Hydro in Canada

John G. Harvey, Sandwell & Co, Ltd

Long-term, sub-25% load factor favors gas units over steam, diesels, when hydro loses race with load.....p 69

Tower Supplements River Cooling

H. J. Nickel, Jackson & Moreland, Inc

Properly selected adjunct is economic for recirculating water when stream flow is below condenser needs.....p 73

INDUSTRIAL

Simple Radials Can be Reliable and Economic

E. J. Bartley, A. Ketvirtis, I. S. Cooper, Foundation of Canada Engineering Corp

But they must be designed to meet the special requirements of each manufacturing plant and properly protected.p 78

SYSTEM ENGINEERING

Arizona Computer Study in Second Year

Budgeting and forecasting, and system operation problems are major areas under study in joint project.....p. 76

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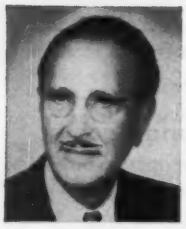
Soggy land and heavy reels of Okonite Cable presented a rugged installation problem. But by digging a 4-foot trench, and by "putting the Cat before the truck before the float," Guarantee Electrical Co. laid down two cables simultaneously at three miles per hour. Cables were a 15kv, 3-conductor Okolite-Okoprene submarine power cable and a 24-conductor Okolite-Okoprene submarine control cable designed to assure the continuous water supply essential to plant operation.

"We specified Okonite because...

This tough installation called for top-quality cables to assure continuous plant operation"



"Demanding assignments are 'our meat'," says Arthur Kaspar, Chief Electrical Engineer of Guarantee Electrical Company of St. Louis. "A good example is our recent cable installation for a large plant here in Missouri.

"Our client specified a never-failing, 24-hour-a-day, controlled source of plant water. The best pumping station site was miles from the plant, in low-water marsh land subject to periodic flooding from the Mississippi River—up to 25 feet above river level. One thing was certain . . . this called for really dependable cables for power and for control of the complex pumping station that would supply the water to the plant.

"Another thing was certain, too . . . this was a job for Okonite. Our experience has taught us that Okonite gives maximum insurance and value where dependability in vital circuits is concerned."

Conferences between Mr. Kaspar and Okonite developed the proper cables: unaffected by water, highly resistant to soil conditions and other factors that attack *any* buried or submerged cable, and backed up by Okonite's 78 years of making highest-quality cable.

* * *

For your vital circuits, take a tip from Mr. Kaspar and other leading electrical engineers and specify Okonite. Whatever the installation, when you talk to Okonite you'll get an unprejudiced recommendation for your cable needs because Okonite, *and only Okonite*, makes cable by all four insulating methods: strip, dip, extrusion and taping. The Okonite Company, Passaic, New Jersey.

5248

***where there's electrical power... there's* OKONITE CABLE**

Who Does the Most Good?

When we read the newspaper, we find that the people who make the news are political leaders, labor leaders, gang leaders, and criminals. Once in a while a lonely economist can get in an intellectually honest statement about the economy. Perhaps a banker can air his views on the discount rate. And now and then a business leader can present his case. Even educational leaders are allowed a turn.

So what kind of leaders do not get much space. Well, it turns out to be the leaders which the American people think do the most good for the country—religious leaders.

In a recent survey Elmo Roper and Associates found that 46% of Americans say religious leaders do the most good of five groups including government, business, congress and labor. Now 44% said that labor leaders do the least good. Religious leaders have steadily gained prestige since the first survey in 1942 —rising from 18% to 42%. For this we should be very grateful. The success of this great influence on all our lives is most encouraging.

But since 1942, those voting for business leaders as the ones who do the most good for the country have gone down from 19% to 12%. Maybe business leaders had better pay a little closer attention next Sabbath.

Fischer Black

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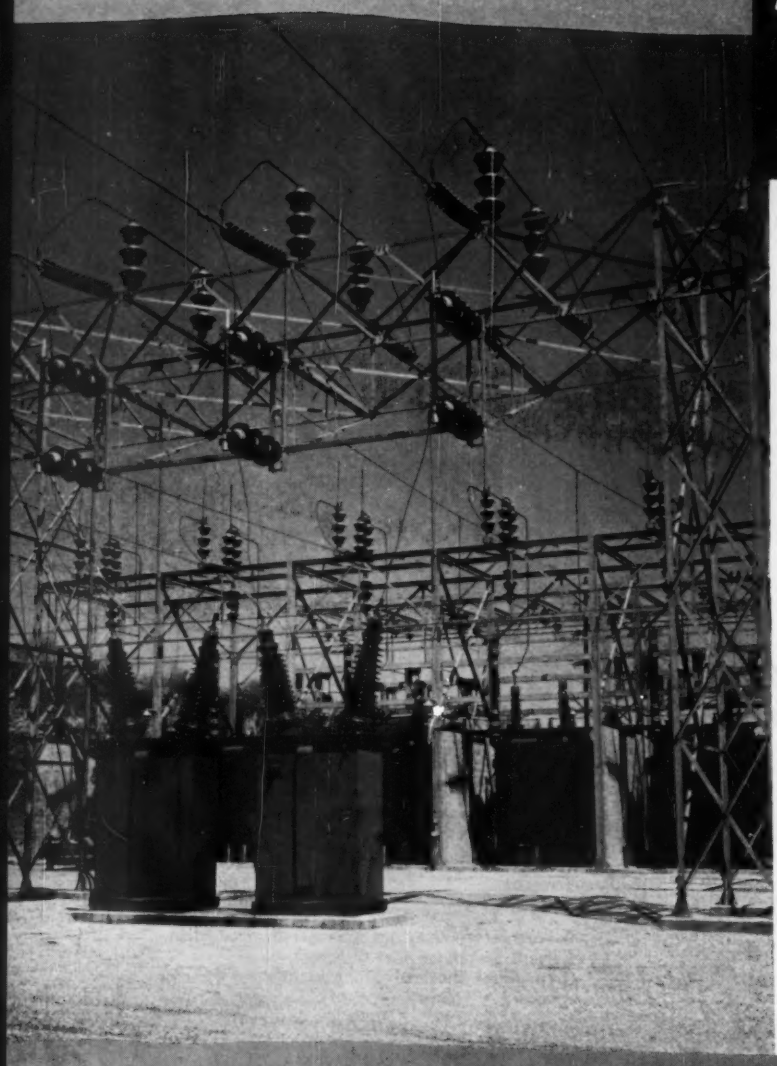
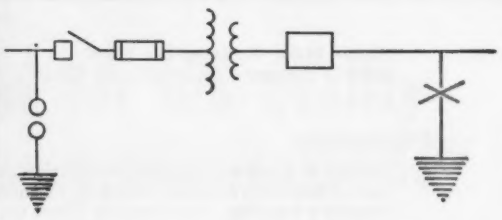


Can a primary power fuse "see" line-to-ground secondary faults?...



(Although the data illustrated are for self-cooled transformers, similar tables are available for forced-air-cooled transformers.)

POWER TRANSFORMERS

***TABLE 3 Minimum Ampere Ratings for the Primary Fusing of Three-Phase or Banks of Three Single-Phase Self-Cooled or Water-Cooled Power Transformers**

Nominal System Kv → / Transformer 3-Phase Kva ↓	23		27.6		34.5		46		69		115		138	
	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)	Full Load Current (Amps)	Fuse Unit Rating (Amps)
1000	25.1	40E	21	30E	16.7	25E								
1500	37.7	50E	31.4	50E	25.1	40E	18.9	25E	12.5	20E	7.6	10E	6.3	10E
2000	50.3	65E	41.8	65E	33.5	50E	25	40E	16.8	25E	10	13E	8.4	13E
2500	62.8	100E	52.5	80E	42	65E	31.5	50E	21	30E	12.5	20E	10.5	15E
3750	94.3	125E	78.5	125E	63	100E	47	65E	31.5	50E	19	25E	15.7	25E
5000	126	175E	105	150E	84	125E	63	100E	42	65E	25	40E	21	30E
7500	188	250E	157	250E	126	175E	94	125E	63	100E	37.5	50E	31.4	50E
10 000	252	400*	210	300E	167	250E	126	175E	84	125E	50	65E	42	65E
15 000	376	600*	314	500*	252	400*	189	250E	125	175E	76	100E	63	100E

*Use two fuse units in parallel, each having an ampere rating half of the listed ratings.

Here's an up-to-date answer:

The answer is a qualified "yes" and depends on selection of the proper fuse in the proper ampere rating and speed.

Let's examine fuse selection. Until now, for want of a better approach, the protection engineer has had to use fusing ratios or ampere rating recommendations which were arbitrarily high. Allowances had to be made for not only short-time daily overloads *(both with, and without, forced-air cooling)*, switching, and energizing transients but also for damaging of the fusible element. Moreover, extra provision had to be blindly made for short-time emergency overloading. In this way he was assured that the fuse would not blow unnecessarily. But unfortunately, the full protective range of the modern power fuse was lost.

To help the protection engineer avoid such overfusing, S&C has developed tables of Minimum Ampere Rating Recommendations* for its SMD Power Fuse (see one of four such tables below, left), each one of which is a "sharp-pencil" recommendation that provides real protection for the transformer against secondary faults, even line-to-ground.

The key to these recommendations lies in the precise significance of the term "minimum" in contrast with the customary "cover-all" use of the word. These recommendations have been pared down by tailoring them to include provisions only for transients and short-time daily overloads of the magnitudes set forth by ASA.

These minimum ampere rating recommendations expressly *exclude* allowances for short-time emergency overload, and margins for fuse damage. Here are the reasons:

1. The margin for fuse damage is obviously unnecessary with S&C silver fusible elements.
2. The short-time emergency overloading of fuses is a nonrecurring, controllable condition — such as would occur when one transformer in a duplex substation setup is temporarily out of service (thus placing all the load on the other transformer).

To enable the protection engineer to determine what degree of short-time emergency overload an SMD fuse can sustain, S&C has developed a family of "Short-Time Emergency Overload Capability Curves." These curves plot overload time in hours against overload current. The curves will show that in most applications the fuse ratings given in the Minimum Ampere Rating Recommendation tables will have adequate short-time emergency overload capability, even though allowances were not made for such overloads in the Recommendation tables. By using this special information—new to power fuses—the protection engineer can avoid revising his ampere rating selection upwards to take care of a short-time emergency overload condition that might occur only once a year. Therefore, he does not have to give up some transformer protection.

This paring down of ampere rating recommendations is done to enable the fuse to "see" faults of a much lower order than would otherwise have been possible. A fuse naturally won't pick off the lowest line-to-ground faults, but transformer protection will be greatly increased.

Write for Data Bulletin 262, "Selecting SMD Fuse Units," to S&C ELECTRIC COMPANY, 4421 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

The ampere ratings listed in the table (left) will carry continuous loads within the nameplate rating of the transformer, or short-time daily overloads as set forth below.

Daily Overloads to Give Normal Life Expectancy

(Abstract from ASA Publication, "Guide for Loading Oil-Immersed Distribution Transformers and Power Transformers," Appendix C57.92, published January, 1956.)

Time (Hours) ↓	Times Rated Kilovolt Amperes		
	Self-Cooled and Water-Cooled Transformers		
Initial Load* (Percent) →	90	70	50
½	1.59	1.77	1.89
1	1.40	1.54	1.60
2	1.24	1.33	1.37
4	1.12	1.17	1.19
8	1.06	1.08	1.08

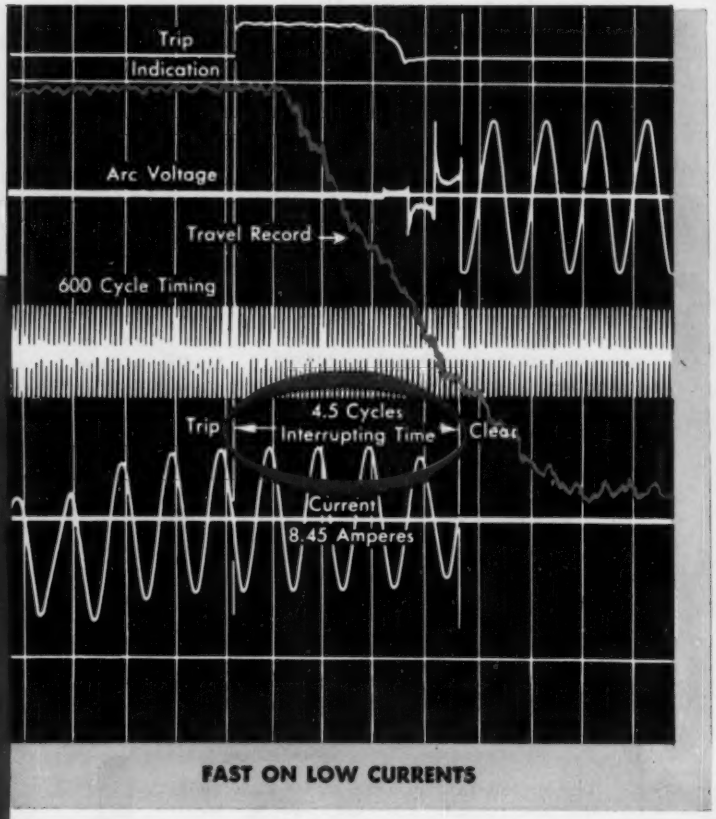
*Use either average load for two hours previous to load above rating or average load for 24 hours (less overload period), whichever is greater. Ambient temperature assumed is 30° C for air and 25° C for water.

S&C ELECTRIC COMPANY

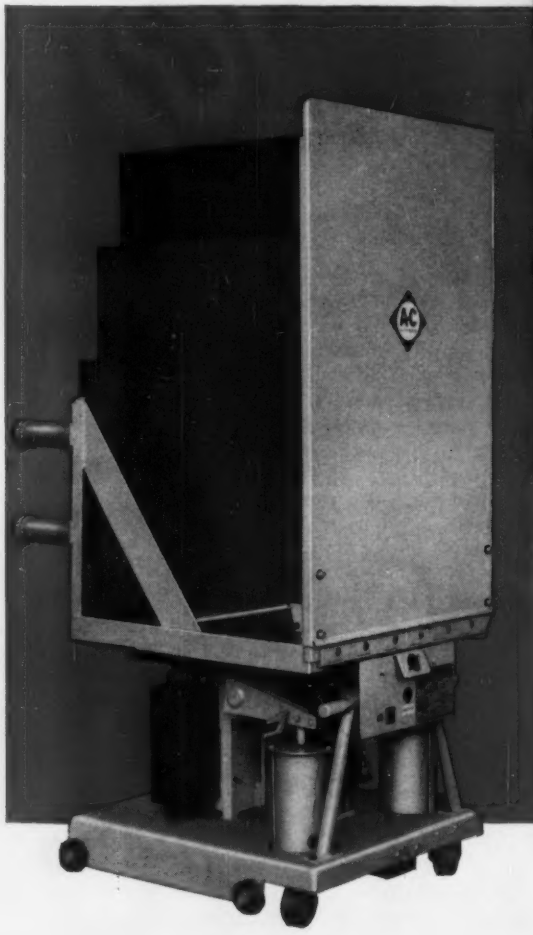
Get 5-cycle interruption with

Reduce conductor sag—

For greatest benefit, fast interruption of all currents is essential. These oscillograms, typical of Allis-Chalmers air magnetic breakers, show fast clearing time on low, medium, and high currents.



FAST ON LOW CURRENTS



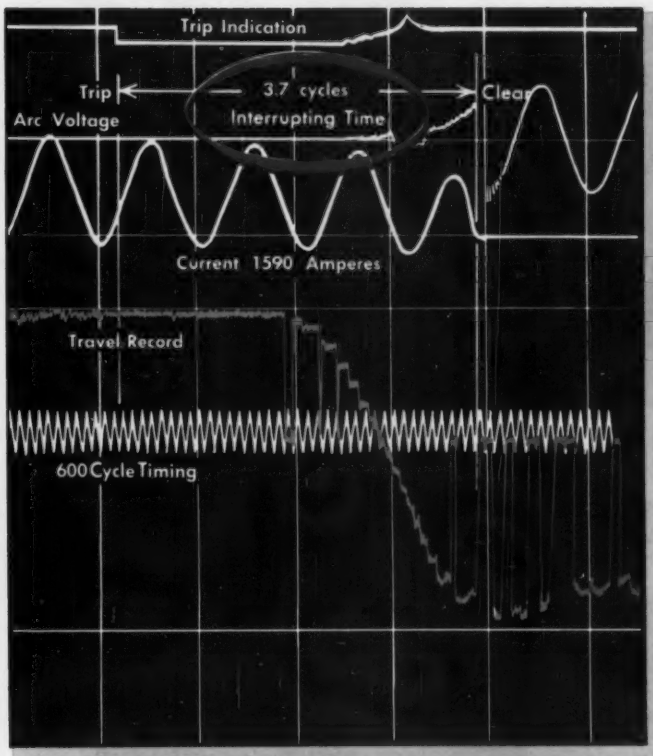
Fast clearing time reduces the damage of a fault to the system. Problems of sagging wires, annealing, and burndown are reduced. Outages are often eliminated.

All Allis-Chalmers air magnetic switchgear

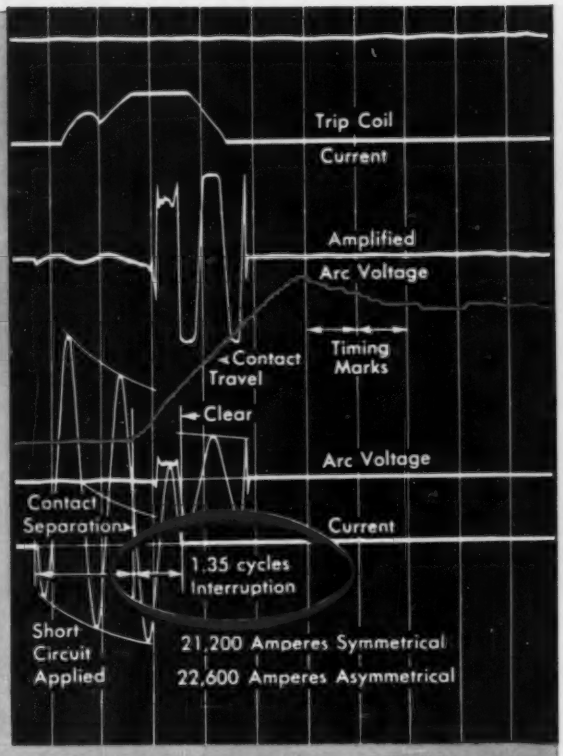
ALLIS-

all Allis-Chalmers air magnetic breakers

annealing—burndown



FASTER ON MIDRANGE CURRENTS



FASTEST ON HIGH CURRENTS

assemblies and primary unit substations are equipped with 5-cycle *Ruptair* breakers.

For additional information, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Ruptair is an Allis-Chalmers trademark.

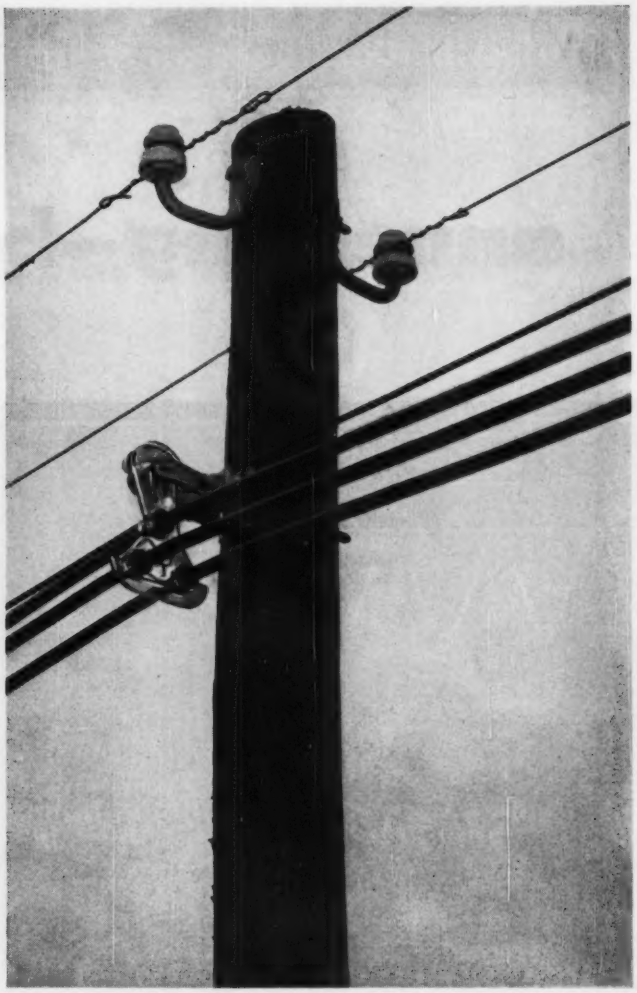
For Progress in Switchgear

CHALMERS

A-C ALLIS-CHALMERS

A-5470

Conventional aerial system required cross-arms...tree-pruning is major cost and irritation factor with utilities companies.



New Roebling Aerial Spaced System with ROECLAMP requires only *one foot* of clearance through trees! Note improved, compact appearance. No cross-arms are needed.

Key to the system is Roeclamp ...unit construction means no separate parts...installs without tools...Linemen go for it!

Here lineman has grommets mounted on conductors and messenger and is about to mount ROECLAMP over messenger . . . ease of installation means one crew can install more line footage per day . . .

New Roeclamp Cable System Costs 60% Less than Self-Supporting Cables, Minimizes Tree Problems, Installs with Ease, Looks Better!*

Roebling Self-Supporting Aerial Spaced Cable is the perfect answer in areas where trees are a problem, where appearance is an important factor, or in areas where the most compact, economical and easily serviced system is desired. That means *just about everywhere!*

The Roebling System, with the remarkable new ROECLAMP, is designed for 5kv use (2400/4160Y and 4800 v delta systems) and 8kv use (4800/8320Y and 7200 v delta systems). Phase identification is positive at a glance, since cables are maintained in the same relative position along their entire length. Phases may be added or removed, and the system may be reinforced *without removing* ROECLAMPS from messenger! *Conductors may be replaced without tools* (except for splices and taps).

Low impedance results in better voltage regulation – and the heat-dissipating properties of the Roebling system mean higher current-carrying capacity. Lightning protection and protection from falling tree limbs are provided by the strong copperweld messenger, which runs the length of the system. Aluminum conductors come in 17 standard sizes and strand constructions to cover a broad range of applications. They are specially made with a greater number of finer strands to give extra flexibility. Standard insulation is extruded Roeplastic® P-117, although other types of extruded insulations are available, depending upon proposed usage.

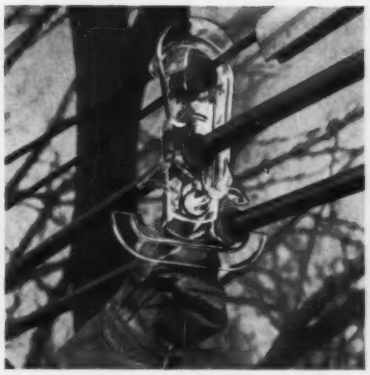
The Roebling Aerial Spaced System featuring the ROECLAMP costs less, installs fast, gives optimum service and requires minimum maintenance. You can't afford not to investigate it! Your Roebling representative can give you a demonstration of the revolutionary new ROECLAMP—and will give you more facts about this remarkable system. Call him – or write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

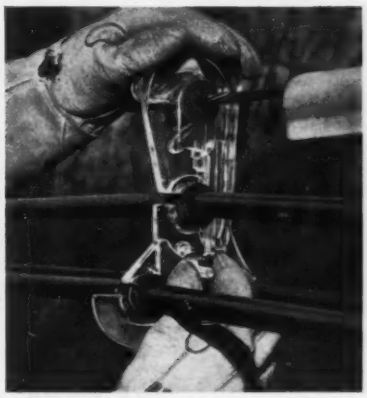
Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

* Patent pending

One motion and ROECLAMP is on messenger and ready to receive conductors. Phase changes and repairs do not necessitate removal of clamp. ROECLAMP comes complete with grommets to fit messenger and conductors you order . . .

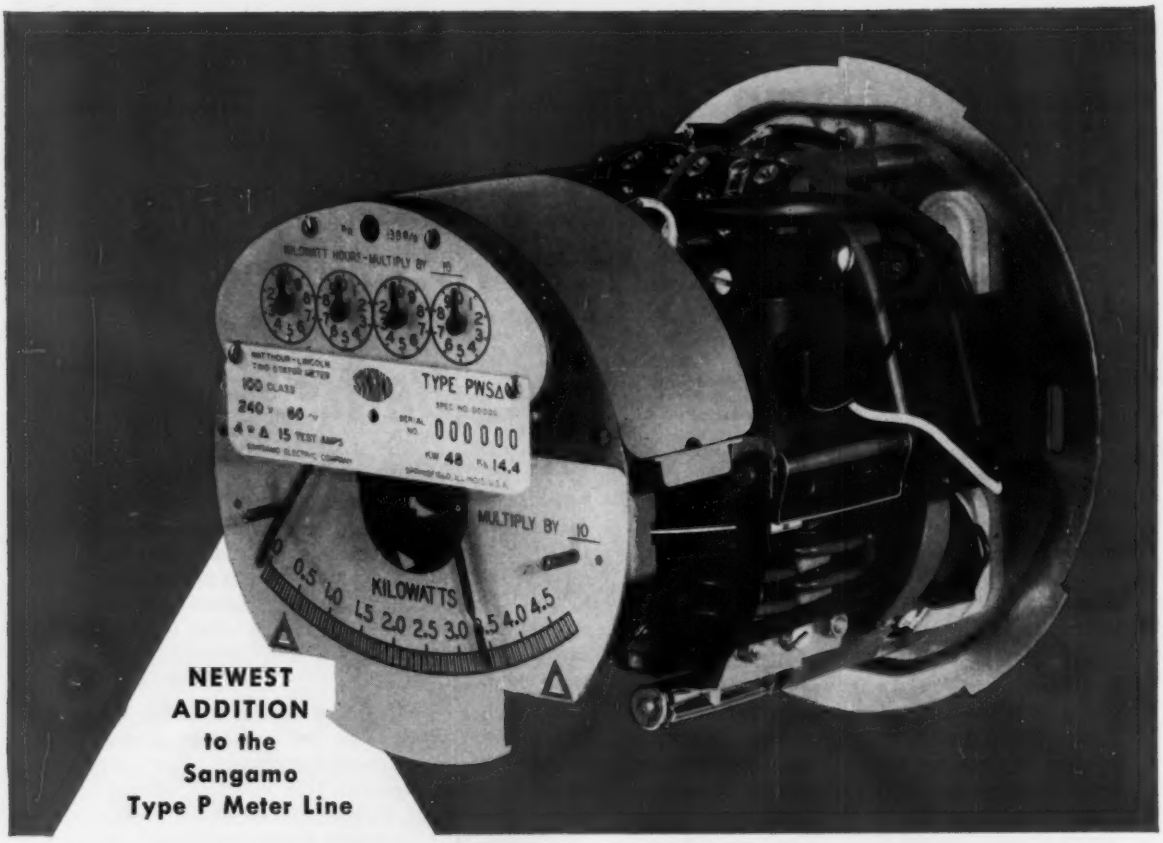


Note how easily conductors drop into place. Installation is measured in seconds, even with "boxing" gloves on. ROECLAMP is Plexiglast, tests to over 1000-lb. breaking strength, offers outstanding weather resistance, best possible electrical properties . . .



36 ROECLAMPS are required every 1000 ft. Installation is completed by hand-tightening of nut. Not even a screw driver is required!

† Reg. T.M.—Rohm & Haas Co.



NEWEST ADDITION to the Sangamo Type P Meter Line

Sangamo Type PWSΔ—compact polyphase Combination Watthour and Lincoln Demand Meter

NOW . . . for convenient, dependable demand measurement of all polyphase circuits . . . Sangamo presents the Type PWSΔ combination watthour/thermal-demand meter.

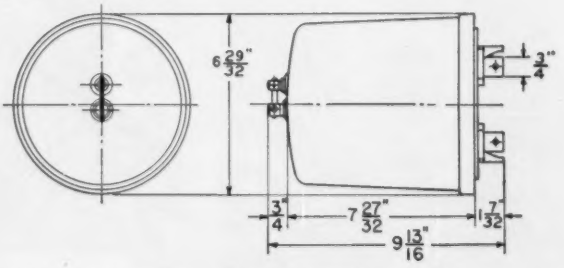
ALL NEW DESIGN combines the features of Sangamo's new two-stator four-wire delta meter with the time-proven Lincoln watt demand meter. Both the watthour meter and the demand meter are complete units that function independently on entirely separate circuits.

COMPACT CIRCULAR CONSTRUCTION . . . USES CONVENTIONAL ROUND COVER

The Type PWSΔ is a compact assembly that is mounted on a standard circular base plate, and is enclosed by a conventional round glass cover. The PWSΔ is built like—and looks like—the popular Sangamo Type J2TS.

EASY TO READ—EASY TO ADJUST. Kilowatthour dials are never obstructed by the demand pointers. Simple and readily accessible adjustments are provided for both demand and watthour meters.

EASY TO MAINTAIN. All Lincoln secondary leads are solder-connected at convenient junction blocks. Register assembly can be removed without disturbing soldered connections for easy access to watthour meter components. Watthour meter—including bearing system—is *guaranteed for life.*



THE COMPLETE LINE OF SANGAMO TYPE P METERS WILL HANDLE ALL POLYPHASE MEASUREMENT

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

FAST • SIMPLE • ECONOMICAL

UNISPLICE

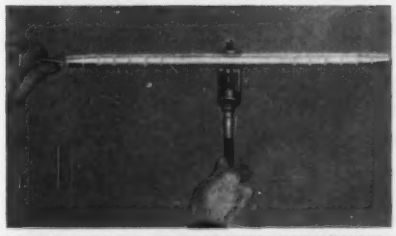
FULL TENSION HYSPLICE FOR ACSR

5 STEP 2-PIECE SPLICING

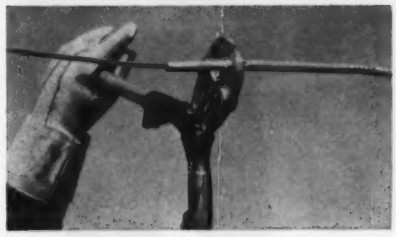
1. Aluminum strands must be carefully stripped back to the correct length. Care must be taken not to nick steel core.

2. Position of aluminum sleeve is marked on cable to facilitate subsequent centering over steel core. Lineman must then remember to slip aluminum sleeve onto conductor.

3. Steel sleeve is then crimped onto steel core.



4. Aluminum sleeve is properly centered over steel core. PENETROX is pumped into aluminum sleeve thru filler hole.



5. Aluminum sleeve is finally crimped onto cable.

2-STEP UNISPLICING

1. Cables are inserted into one piece aluminum UNISPLICE. No stripping, no marking or centering required.

2. Install UNISPLICE using BURNDY MD5-3 Hytool or Y35 Hypress. UNISPLICE is factory filled with PENETROX.

WRITE FOR UNISPLICE BULLETIN

BURNDY

NORWALK, CONNECT. • TORONTO, CANADA

58-5

Copperweld* Type M Guy Strand offers double economy: 1. lower first cost, 2. lower maintenance costs. Research and new production techniques make it possible for us to manufacture Type M at savings which are passed on to you. The result is Copperweld quality costing you less than before. And the savings don't end after installation. They continue year after year because Type M Guy Strand requires so little maintenance. It will last as long as modern poles.

Seven strengths are available: 2.2M, 4M, 6M, 8M, 10M, 12.5M and 16M. Easy to handle—easy to install, Type M Guy Strand can be readily bent, served, moused or clamped. Write us today for complete information about this new product and its money-saving features.

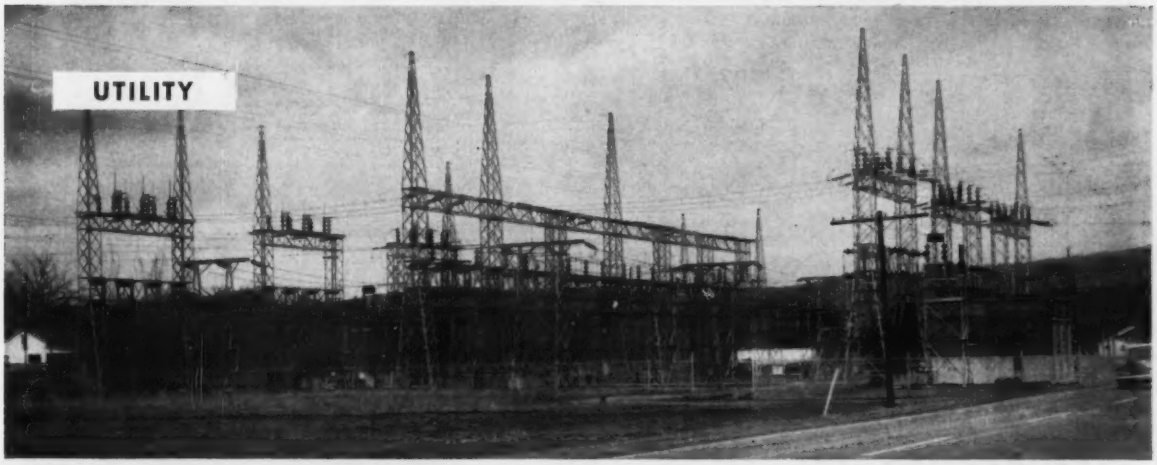
*Trade Mark

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

New Copperweld TRADE MARK
TYPE M GUY STRAND

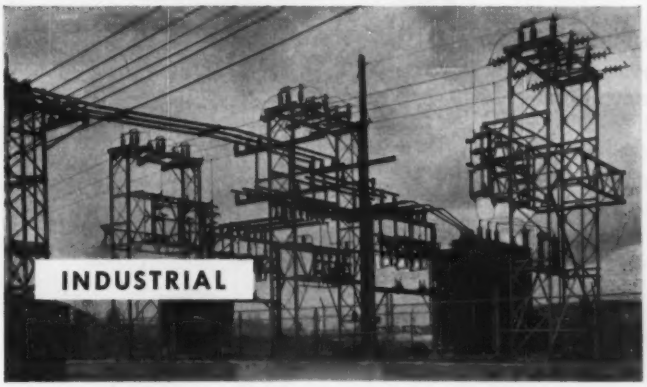
2.2M 4M 6M 8M 10M 12.5M 16M

R&IE Unified Responsibility for...



OUTDOOR SUBSTATIONS

From Layout to Line—the R&IE Unified Responsibility for all structure and switching problems is your assurance of a properly designed, well coordinated substation. Either a transmission structure or a service entrance industrial structure, simple or complex, is carefully developed with an aim to maximum operating economy at the lowest cost. "Under one roof" R&IE controls design, fabrication, application and manufacture of blade switching equipment, and shipping. Now is the time—during these cost conscious planning days—to place your problems with R&IE.



DESIGN—The problems of electrical clearances, efficient switching arrangements, wind stress, wire pull, weather, air contamination—all have been studied and solved for over forty years. Take advantage of this experience.

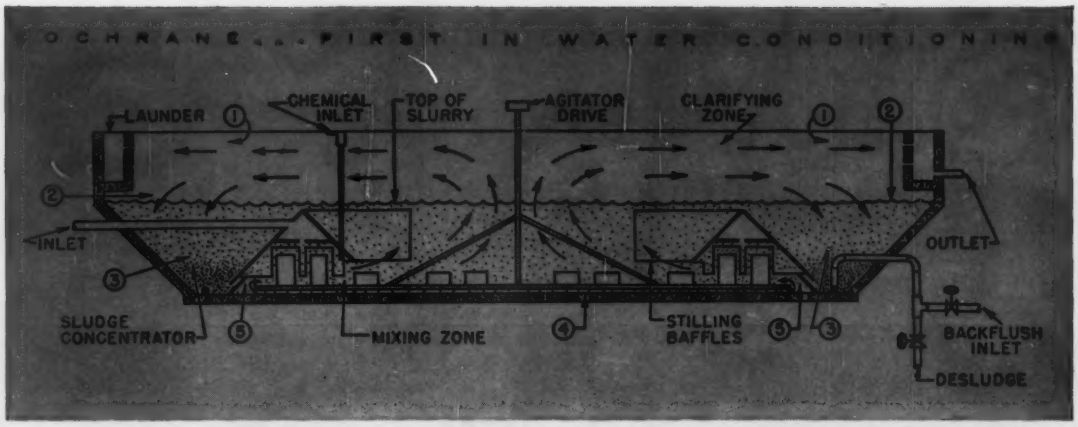
DETAILING—Development of single line diagrams by R&IE experienced draftsmen, detailers, and checkers—gets the job into fabrication sooner, and provides for clean cut, understandable drawings that you can clearly read as the job you want.

FABRICATING—R&IE fabricating facilities are modern and efficient—with time-saving automatic spacing and punching equipment, straightener and bending machines, power shear cutters, and galvanizing facilities—all operations resulting in neatly packaged, well marked substation members that will go together properly on the erection site.

APPLICATION OF BLADE SWITCHING EQUIPMENT—The relation of substation production and the building of air-switches is important—when both are handled "under one roof." With over forty years' design know-how, R&IE equipment application engineers have pioneered many switch features which are today's standard of the industry.

R & IE EQUIPMENT DIVISION
I-T-E CIRCUIT BREAKER COMPANY
GREENSBURG, PA.

R&IE



A **Cochrane** solids contact reactor is designed to provide the ultimate in clarification

Cochrane suspended solids contact coagulating and softening clarifiers are packaged units that combine a mixing zone at the bottom with a clarifying zone above.

A bottom agitator in the mixing zone keeps old precipitates in constant suspension. Thorough mixing and contact between the old and new precipitates is thus assured. This results in a more complete reaction with a minimum in chemical requirements and retention time. In the clarifying zone the water is effectively separated from the slurry precipitates and clarified.

The Cochrane reactor design is unique in its baffle and agitator arrangement, as follows:

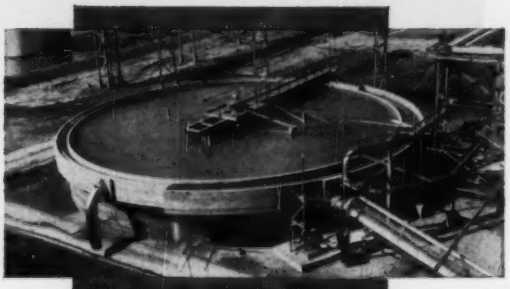
① Radial *Horizontal* Flow—*Not Upflow*. Velocity decreases from center to launder. Slurry particles separate more efficiently from horizontal flow than from upflow.

② Slurry flow is *downflow* in clarifying zone below collecting launders—*not upflow*—thus preventing carryover of turbidity into effluent.

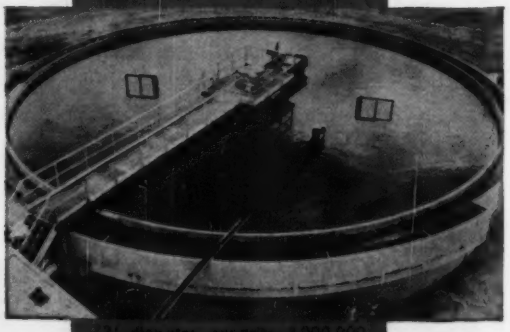
③ Sludge settles only in annular *concentrator* outside of mixing zone. Maximum concentration results because no turbulence is present. This feature saves wastage of water in desludging.

④ There is no premature loss of slurry strength in mixing zone because no sludge settles on the floor of mixing zone.

⑤ Turbulence in mixing zone assures excellent mixing. A large, full-diameter agitator causes centrifugal outward flow, against the diverting baffle in front of the outer port and turns flow inwardly towards central port.



GPD located in Georgia.



diameter, capacity 1,000,000 GPD located in Texas.

GPD located in Wisconsin.

Cochrane

CORPORATION

3146 N. 17TH STREET, PHILADELPHIA 32, PENNA.

NEW YORK • PHILADELPHIA • CHICAGO

Cochrane Water Conditioning Ltd., Toronto 4, Montreal 1, Winnipeg 1, Canada.

Representatives in Thirty Principal Cities in U.S., San Juan, Puerto Rico; Honolulu, Hawaii; also: Paris, France; La Spezia, Italy; Mexico City, Mexico; Havana, Cuba; Caracas, Venezuela; San Diego, Chile; Manila, Philippine Islands.

Pottstown Metal Products Div.—Custom built carbon steel and alloy products

Demineralizers • Hot Process Softeners • Hot Zeolite Softeners • Dealkalizers • Reactors • Deaerators • Continuous Blowoff Systems Condensate Return Systems • Specialties

Tough! Durable! Easy Stripping!

Southwire VWP*

*VINYL WEATHERPROOFING

For Line Wire and Service Drops

HERE's the ultimate in a weather-resistant covering. Southwire VWP combines ruggedness with good weathering, aging and dielectrical properties. It permits a wire of smaller over-all diameter—a lighter wire that's tough, strong, easy to handle.

Ask any man who's put it up how easy it is to strip—how it speeds installation. Pull it over crossarms! Drag it over rocky ground! Southwire VWP is made to take it.

And best of all, Southwire VWP is priced to sell competitively.

Write for free bulletin which gives complete information and technical data on Southwire VWP.

Check these features

- It's tough—resists mechanical abuse.
- Light and easy to handle. Permits free stripping.
- Excellent weathering properties—resists sunlight and aging.
- High impact strength; high abrasion and tear resistance.
- High tensile strength and elongation. Good flexing properties.
- Excellent electrical properties.
- Has very wide installation-temperature range; even wider operating-temperature range.
- Resists flame; will not support combustion.
- Resists acids, alkalies and other chemicals. Resists oil and grease.
- Low moisture absorption.
- Unaffected by oxygen and ozone.
- Superior properties permit thinner jacket, smaller over-all wire diameter.

SOUTHWIRE serves the world

with these quality products:

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP* (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories

Southwire® Company

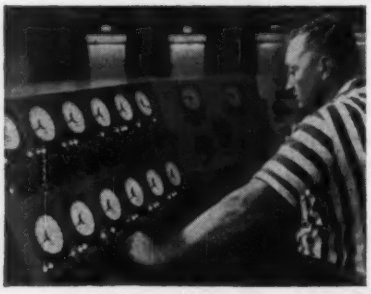
TErrace 2-6311 CARROLLTON, GEORGIA

FOR THE POWER SYSTEMS OF TOMORROW

Under L&N controls, the ETR puts

Reactor Components on Trial

Written by R. N. Brey, in Charge Nuclear Systems Group, for this advertisement.



• The Engineering Test Reactor, a 175,000-kw nuclear reactor which went critical in September, is now being used for the testing of reactor components. The ETR contains the most advanced facilities yet devised for environmental studies of various fuels and other reactor materials under varying nuclear reactor pressures, temperatures, and amounts of radioactivity. Results of the tests are helping to determine the most efficient and economical reactor designs for the power systems of tomorrow.

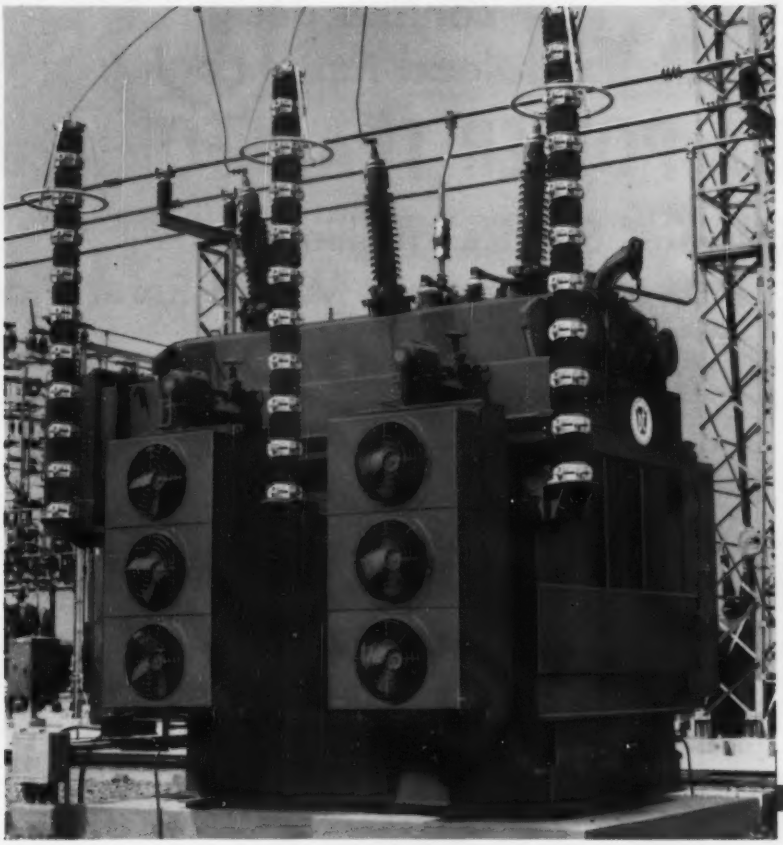
Versatile controls required

The design of the ETR required a versatile control system that would do its job dependably under many conditions. Instruments were needed to provide information on a very large number of parameters, quickly and accurately. Controls for the ETR were planned by Leeds & Northrup as a single, coordinated system that would assure maximum precision and flexibility.

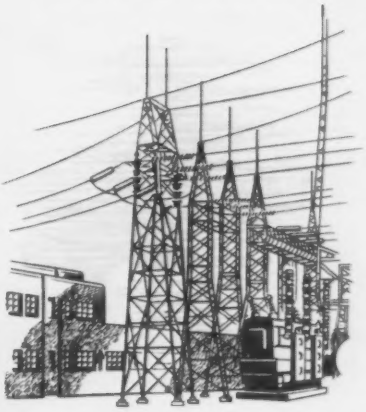
A six-channel system

The reactor is controlled through six different channels. One, a pulse-counting channel, measures and controls power rise from the low level at start-up. As the power passes to higher levels a "log N-period" channel measures the rate of rise, and a servo channel maintains the reaction at preset operational levels through a feedback loop. A process-monitor chan-

Continued on page 123



AT WOOD RIVER POWER STATION



At Wood River Power Station in Illinois, a 100,000-kva Pennsylvania LTC Transformer connects 138-kv and 34.5-kv buses to permit interchange of capacity between the two buses.

To Apportion the Load between Two Generators...

ILLINOIS POWER COMPANY CHOSE A 100,000 Kva LTC Transformer by PENNSYLVANIA

The total capacity of Illinois Power Company's Wood River Plant is 250,000 kw, of which 150,000 kw is connected to a 138-kv bus and 100,000 kw is connected to a 34.5-kv bus. By interconnecting these two buses with a 100,000-kva Pennsylvania LTC Power Transformer, Illinois Power is able to apportion the load between them to permit the greatest possible efficiency and economy of operation.

There are times (particularly during maintenance periods) when the load on the 34.5-kv bus is greater than the generating capacity at that voltage. When this occurs, part of the load is carried by the transformer, which in effect "transfers" it to the 138-kv bus. Conversely, there are other times (such as minimum load periods) when the load on the 34.5-kv bus is *less* than capacity and the transformer delivers this excess to the 138-kv bus.

The transformer—which features Pennsylvania's space-saving, weight-saving, shell-form Contour Design—has load tap changing equipment for plus or minus 10% regulation in 32 steps of 5/8%. The exceptionally quiet and efficient operation of this high-capacity LTC equipment is one of many reasons why leading utilities so often choose Pennsylvania. Contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

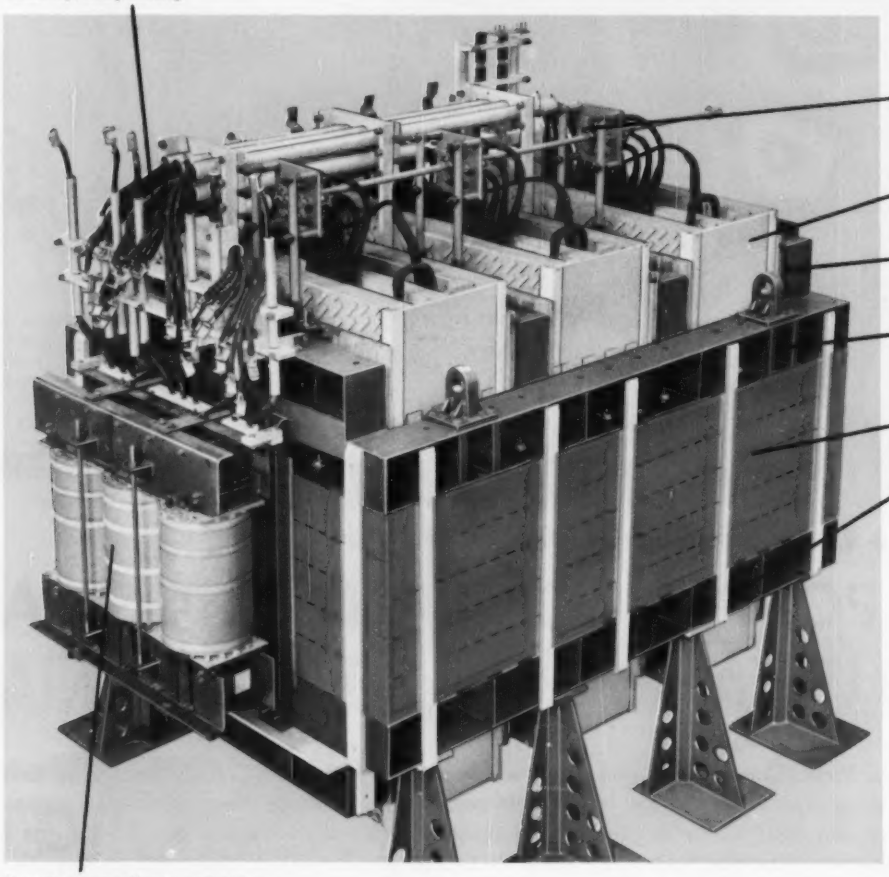
PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA POWER TRANSFORMERS

See next page for design details

100,000 Kva contour design load tap changing PENNSYLVANIA POWER TRANSFORMER

In "Bus-Tie" Service at Illinois Power Company's Wood River Plant


Tap leads for LTC equipment in neutral end of high voltage winding.
High voltage manual tap changer is accessible through manholes for inspection and maintenance.
Vertical cooling ducts in coils permit free flow of oil through coils for most efficient cooling.
Heavy box sections form part of core frame and clamp coils to protect against short circuit forces.
Core and coils clamped together with heavy steel frames. Core-and-coil unit can be handled separately as complete sub-assembly.
Core cooled by both vertical and horizontal ducts.
Core-and-coil assembly rests on bottom section of Contour Design tank.
Preventive autotransformers maintain current flow during LTC operation.

100,000 Kva, three phase, 60 cycles, 55° C. temperature rise. Forced-oil, forced-air-cooled. High voltage: 132,000 Grd.Y volts with two 2½% taps above and below normal and LTC equipment for ± 10% regulation in 32 steps of ⅝%. Low voltage: 34,500 Δ volts. Shell-form Contour Design.

Pennsylvania has the *Facilities* and the *Capability* to meet the Largest Power Transformer Requirements...

- A large, expertly-staffed engineering department with long experience in power transformer design—both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.

McGRAW EDISON

PENNSYLVANIA pt TRANSFORMERS

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for installation view . . .

The Electrical Newsletter

FUTURE NEWS ▶ **It is rumored that the Internal Revenue Service will rule** that Electric Companies Advertising program contributions cannot be included as an operating expense for tax purposes.

A new reactor concept is being pushed by a large manufacturer. Research and development have been completed, totally with private funds. Firm is now looking for a utility to pay building costs.

Power reactor schemes incorporating heavy water as a moderator will probably receive top AEC consideration.

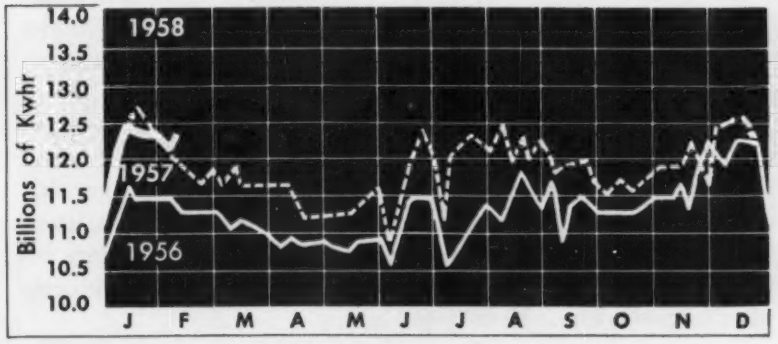
LATE NEWS ▶ **Despite continuing drag of industrial slowdown** weather snaps electrical output from a minus to a plus for the first time in several weeks (See output chart below).

Electric space heating promotion is launched by South Carolina E&G, a combination utility. Company will pay cash bonus of $2.00 per 1,000 installed Btu to residential, general service customers.

Exploding oil switch blew a hole in wall of Cleveland Electric Illuminating Co's North Randall substation at 12:53 PM Feb. 10, knocking out seven feeders serving the city's eastern suburbs. Service was restored in two hours. Damage: About $3,000.

Management promotions . . . James M. Stuart, vp and associate general manager, is elected president and general manager of Dayton P&L, succeeding Kenneth C. Long who becomes chairman. Long succeeds Frank M. Tait, who is retiring but becomes honorary chairman . . . San Diego G&E elects Sherman Chickering as vp.

Power Output—Up 2.2% (Week ending Feb. 8), Kwhr 12,289,000,000



Per Cent Change From Previous Year

	Jan. 25	Feb. 1	Feb. 8
Total U.S.	−0.1	−0.7	+2.2
New Eng.	+0.7	+0.7	+1.9
Mid. Atlan.	−0.1	−1.7	+0.9
Cent. Ind.	−2.6	−3.1	−1.8
West Cent.	−0.3	−1.2	+1.8
Southeast	+3.0	+5.0	+10.0
South Cent.	+2.8	−0.3	−0.1
Rocky Mount.	+2.7	0.0	+2.1
Pacific			
NW	−7.6	−7.7	+1.5
SW	+2.4	−1.4	+0.6

Seasonally Adjusted Index 231.4

Week Ago 227.5 Year Ago 226.1

Atomic Energy Commission requirements—1,050,000,000 Kwhr (Electrical World estimate). Excluding AEC, output increase was 3.4%

The Electrical Week

THE ECONOMY ▶ **The buying public is digging in for the duration.** It's irked at high prices, worried about its wallet, and aware that the overall economy has dipped, finds a University of Michigan "consumer confidence" survey. There's no sign of a pick-up in durables. But optimists still outnumber pessimists 3 to 1, the "confidence index" still stands higher than in late 1953, and one-third of the surveyed families reported an income gain last year **(p 107).**

WASHINGTON ▶ **Electric utility companies are feeling the effects** of a long-dormant Internal Revenue Service regulation. Several companies have been reminded that money spent on so-called "propaganda" and "political" advertising is disallowed in corporate income tax returns. Reliable sources say a review of power company tax returns for 1954-56 already is underway in some places **(p 66).**

ATOMIC PROGRESS ▶ **Should the government build, or subsidize, big nuclear plants?** This question is to be argued before Joint Committee on Atomic Energy this week. Clearly defined long-range goals could help the domestic program, but some critics insist private enterprise "isn't able or willing" to take losses associated with atomic pioneering. Pressure for government-built A-plants is growing fast **(p 65).**

EVENTS ▶ **An outright subsidy of teachers salaries** at all school levels is the only way the U. S. can regain its scientific prestige, delegates to AIEE's Winter General Meeting were told **(p 62).** L. F. Hickernell, AIEE presidential nominee, describes in EW interview the Institute as he sees it **(p 64).** J. K. Hodnette, executive vice president, Westinghouse Electric Corp, wins Edison Medal **(p 62).**

SYSTEM ENGINEERING ▶ **An electronic computer is investigating** the first group of 78 problems related to the Arizona Public Service Co system. Some of the machine's work is in areas of budgeting and forecasting, with emphasis on budgetary controls. A big part of its work involves system operating problems, including power interchanges and the planning of economical future system expansion **(p 76).**

GENERATION ▶ **Two gas turbines now are on British Columbia Power Commission's** lines. Two more are due for service this year, making the 76-Mw Georgia station the world's largest gas-turbine plant. Gas turbines were chosen because hydro construction is unable to match increasing power load. Also about 80 Mw of peaking capacity was needed by late 1957, and more firm power will be required when a reservoir is filled in the future. But there were other considerations that pointed an economic finger toward gas turbines: Fast delivery, lower capital investment, faster start-up, lower labor and standby costs, increased winter capacity. Here's how BCPC tackled the problems peculiar to gas-turbine plants **(p 69).**

Are cooling towers economical for steam plants? Often they are if a small river has been impounded to provide the plant's circulating water. During the year's driest season, the river may be unable to meet the plant's full circulating water requirements. The economic size of a supplementary cooling tower is influenced by three factors: (1) Seasonal load patterns, (2) River and air temperatures, and (3) The stream's hydrology **(p 73).**

INDUSTRIAL ▶ **Simple radial distribution systems can be justified** in industrial plants, from the standpoint of reliability, if properly designed and protected. Often network or secondary-selective systems are chosen by engineers who consider them more trustworthy. Both are more complex and costly. Here's how a manufacturer chose a simple radial, why he chose 115 kv as supply voltage instead of 11 kv, and how he designed the system to minimize trouble **(p 78).**

NEW EQUIPMENT ▶ **Magnetic air breakers operate in two cycles** to cut line burning, improve coordination, and minimize conductor annealing during faults . . . One or two-bushing 100-kvar capacitors come in ratings of 4.8 through 7.96 kv **(p 96).**

MANUFACTURERS ▶ **Preformed Line Products Co opens research** and engineering center to attack physical problems of overhead transmission and distribution—namely conductor stress and tension **(p 67)** . . . R&IE Equipment Div of I-T-E Circuit Breaker Co announces first 46-kv automatic circuit reclosers are off production line . . . Westinghouse reports four new developments **(p 112).**

Commerce Department predicts 1958 will be better than '57, but off from '55 and '56. Outlook is bright for interior distribution industry, "uneasy" for high-voltage T&D equipment. Production of motors and controls should run 3% above 1957, and lighting equipment should beat last year by 9.5% **(p 109).**

SELLING ▶ **The relation between adequate wiring and house mortgage** is one of the big considerations for the future all-electric home. A New York architect points out: "To have an obsolete wiring system after only a fraction of the life of the mortgage is absurd." Other all-electric features for the future include heat pump, high-fi, intercom, fire-alarm system, grounded receptacles, outdoor lighting **(p 86).**

PEOPLE ▶ **A. B. Chance Co promotes** Jackson T. Isbell and L. C. Hansen to assistant to the president, and vice president of marketing, respectively . . . Sangamo International, Inc, appoints W. A. Kennedy vice president and general manager . . . Thomas & Betts Co names four new vice presidents: Karl G. Kempf, H. Chester Moses, Jr, C. A. Biddulph, and Carroll A. Badeau **(p 118).**

Executive Reader

Despite the plaudits directed at Britain for its nuclear power production at Calder Hall and additional capacity under construction at Dounreay and Chapel Cross, nuclear power output is not expected to show up in Central Electricity Generating Board's returns before 1960. Reappraisal of coal resources and consumption now points to a scaling down of their nuclear goal to 3,000 Mw by 1965, down from the earlier 6,000 Mw with attendant savings approaching $1 billion.—**The Electrical Journal, Dec 27, 1957.**

Excellent service in preventing oxidation and moisture absorption of transformer oil is reported for a new flexible rubber diaphragmed oil conservator. An oil-resistant rubber diaphragm is mounted in an oil-tight manner between two halves of a cylindrical expansion chamber. The space below the diaphragm is completely filled with oil; the space above it is open to atmosphere. With transformer oil level at its lowest, the diaphragm follows the contour of the lower half of the chamber. With maximum oil level it bulges into the upper. — **Bulletin Oerlikon No. 323.**

TECHNICAL NOTES

"Cold Combustion" is under study in Russia. Soviet scientists claim to have directly transformed fuel energy into electricity with an efficiency of over 60% by electrochemical means.

The advent of the supercritical pressure steam generators more than ever requires the complete integration of trip protection controls for the boiler, turbine, and generator.

Selectively tripping or transferring of electrical auxiliaries following a load dump will probably become mandatory for all large units in the future.

FROM EDITORS IN THE FIELD

To locate faults in direct-buried cable, Hawaiian Electric Co applies a test voltage and then checks for vibration pickup of arc discharges. If successful, this method will supplement magnetic and sound pickup techniques for cables buried in tightly packed soils.

An actual demand of 7.5 watts per gross sq ft at a power factor of 85% has been recorded by an eastern utility for a large department store in a shopping center.

UP-GRADE

Your Distribution Arrester Protection With

THOREX® Dynagap

Dynagap element. Without change, this basic component of new Thorex arresters is used in all classes; station, intermediate, and distribution. Design of the gap structure accounts for the remarkable efficiency and performance of new Thorex arresters -- especially evident in the distribution types.

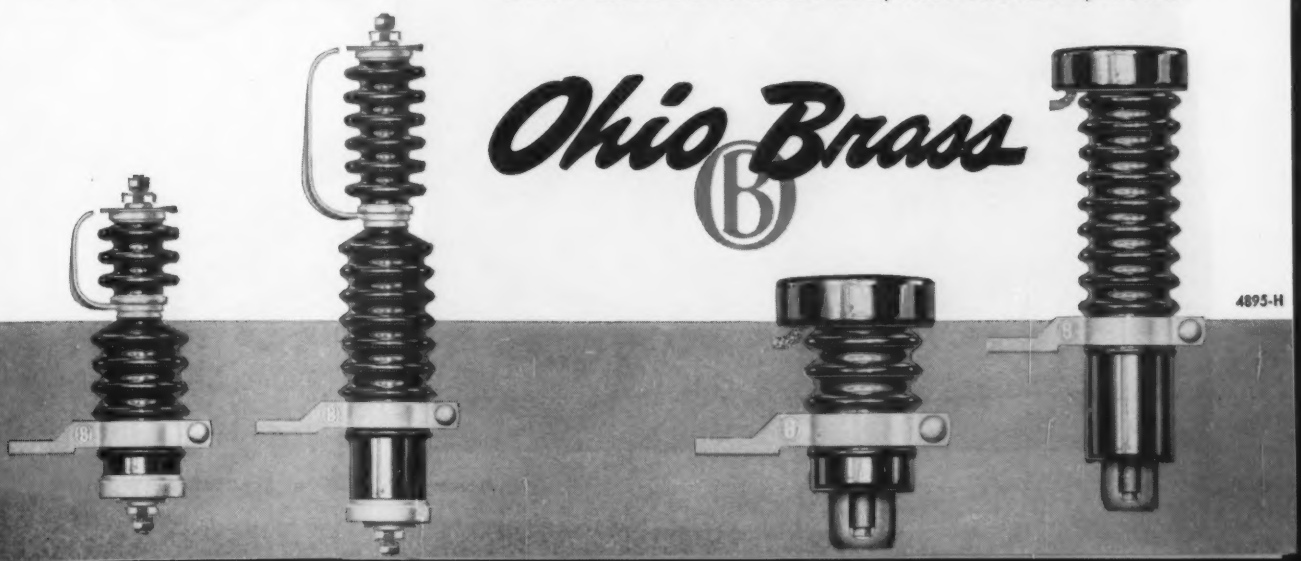
An outstanding characteristic of the new Thorex Dynagap is small size -- making possible the use of identical essential elements in all arrester classes.

Thorex Dynagap distribution arresters, Type DV, have many of the same parts, and many of the same basic characteristics of the highest voltage station models. This is a completely new departure in arrester design.

Without paying any price premium, you can up-grade your distribution arrester protection -- get greater equipment safety -- higher service continuity. Install the new Thorex Dynagap at any location on your distribution system.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass



4895-H

"WHY buy more

Clamp than I need?"

NEW O-B QUADRANT STRAIN CLAMP IS EXCELLENT FOR LOW-COST DEADENDS

"Why buy more clamp than I need?"

If that's your question, then the new O-B light weight Cooline LW clamp is your answer.

It's the same basic design as the heavy-duty aluminum Cooline clamp, used for many years on transmission, sub-transmission and primary distribution lines. But this new aluminum quadrant strain clamp, is lighter weight, costs less, and is designed especially for low stringing tensions.

Like the heavy-duty Cooline, the new LW clamp has a powerful snubbing action which has high holding power without crushing the conductor. The six models in the new Cooline series cover a range from .2 to 1.3 inches in conductor diameter, with ultimate strengths from 7000 to 18000 pounds. Conductor can be strung at deadends with continuous loop . . . no need to cut and splice.

Here's a clamp that is right in step with today's trends in distribution and transmission construction and in keeping with the O-B policy of offering the widest available selection of materials for deadends. Ask for this new O-B Cooline LW the next time you order strain clamps.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Six models of new O-B Cooline series cover conductor diameters from .2 to 1.3 inches.

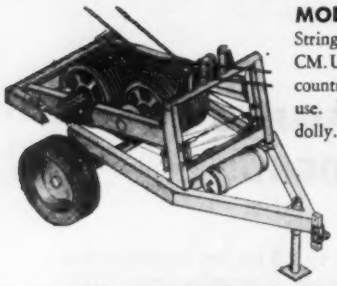
Ohio Brass

4865-H

Partial showing of the now ***COMPLETE*** line of . . .

PENGO TENSION WIRE STRINGING EQUIPMENT

Manufactured by **PETERSEN ENGINEERING CO.,** ***Santa Clara, Calif.*** **14 Patents Pending**

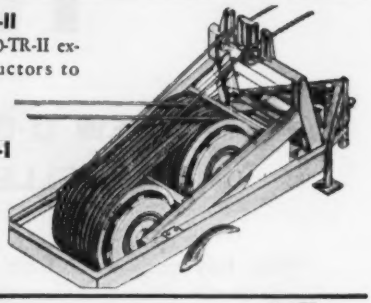


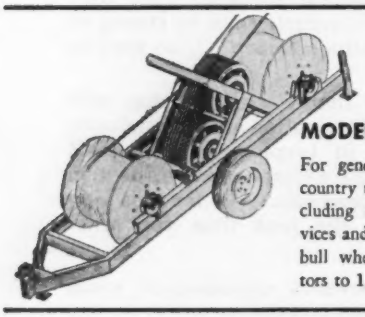
MODEL 5000-TR-II
Strings two conductors to 556,300 CM. Used primarily for very rough country work; also for general use. Use separate reel-carrying dolly.

MODEL 5000-TR-I
Similar except strings one conductor.

MODEL 6000-TR-II
Similar to Model 5000-TR-II except larger. Conductors to 1,272,000 CM.

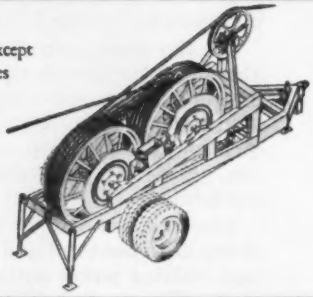
MODEL 6000-TR-I
Similar except for one conductor.

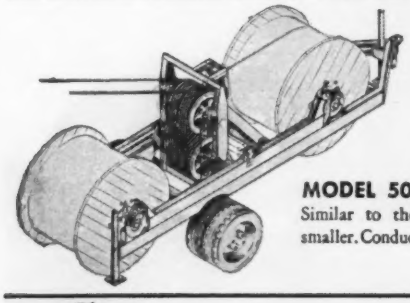




MODEL 6000-WS-TR
For general and medium rough country use. A complete unit including trailer, reel-carrying devices and its own double pair of bull wheels. Conductors to 1,272,000 CM.

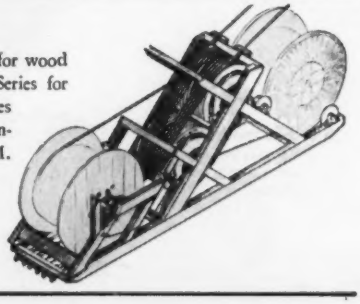
MODEL 7000-TR-I
Similar to model 6000-TR-I except larger. Conductors to 2 inches diameter.

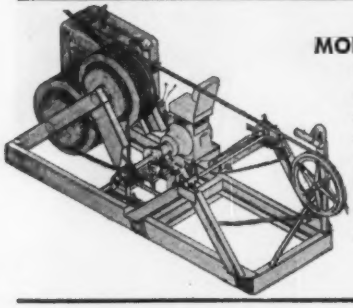




MODEL 5000-WS-TR
Similar to the 6000-WS-TR but smaller. Conductors to 556,300 CM.

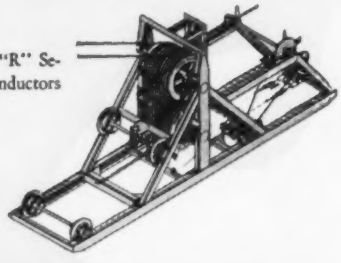
MODEL 6000-W
Available in "S" Series for wood or steel reels, in "R" Series for steel reels, or "SR" Series for trailer mounting. Conductors to 1,272,000 CM.

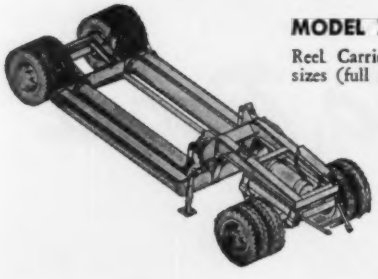




MODEL 6500
Bull Wheel Cable Puller. Available in "R" Series for steel reels, "S" Series for wood reels. Conductors to 1,272,000 CM. Also available in "LWR" Model for extra-large steel reels. Model 5500 similar (smaller).

MODEL 5000-SR
Available in "S" Series, "R" Series, or "SR" Series. Conductors to 556,300 CM.





MODEL 7500
Reel Carrier. Takes the largest sizes (full range) of steel reels. Loads and unloads with one man. No auxiliary equipment needed except the truck that pulls it. For use with any one of the tensioning machines shown on this page.

ADDITIONAL MODELS NOT SHOWN

Tension Reel Trailers

MODELS 2, 3, and 4, Two-Wheel Straddle Dollies not shown. For use with any one of the tensioning machines shown on these pages.

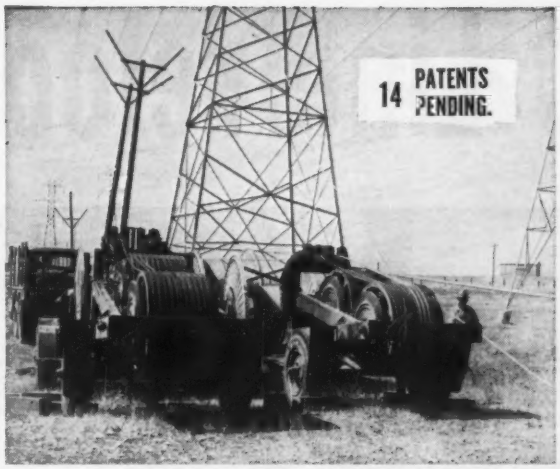
Tension Stringers

MODELS 6000-SK-I and 6000-SK-II For one or two conductors to 1,272,000 CM. Skid mounted for installation on owner's equipment.

MODELS 5000-SK-I and 5000-SK-II Skid mounted for installing on owner's equipment. For stringing one or two conductors to 556,300 CM.

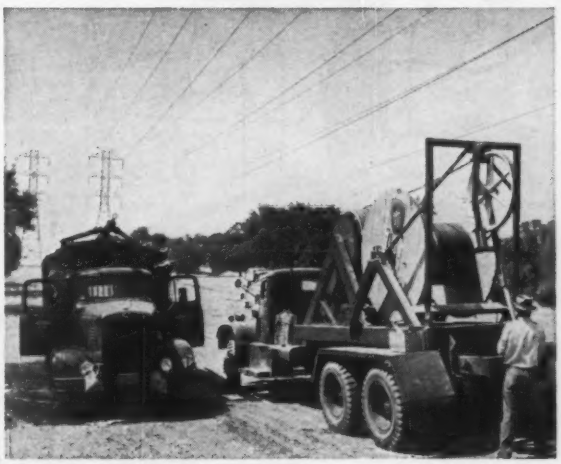
MODEL 5000-WS-III Strings three conductors to 556,300 CM. For mounting on low-bed or full trailer.

MODEL 6000-WS-III Strings three conductors to 1,272,000 CM. For mounting on low-bed or full trailer.



Two PENGO model 6000 TR-II wire tensioners being used by Pacific Gas and Electric Co. in reconductoring job between Vacaville, Calif. and Cottonwood, Calif. 285 miles of 500 MCM copper is being replaced by 954 MCM aluminum in this operation.

Newest method of stringing overhead lines



Two PENGO model 6500 Bullwheel Cable Pullers used by Pacific Gas and Electric Co. for pulling in the new line on the job mentioned above. Unit, manned by an operator and one reel tender, pulls the pulling line (in this instance the old copper conductor) over the double neoprene lined Bullwheels and winds it for shipment in a single operation.

- ***Safest, most economical way of stringing transmission, distribution and even secondary lines.***
- ***Its greatest savings are effected when stringing over and through energized circuits . . . by far the safest, too!***
- ***14 Patents pending!***

Smooth, positive control of conductor tension can be maintained at all times regardless of model or size of PENGO tensioning equipment used. The large, specially designed PENGO disc brakes are mounted away from the Bullwheels to assure dissipation of the heat generated by the continuous braking action and prevent transmission of the heat to the Bullwheels.

Note the wide range of models on the opposite page available for all types of jobs or terrain and for all sizes of conductor.

List your requirements and send for descriptive literature and prices.

Made by the makers of the World-Famous
PENGO EARTH AUGERS

PETERSEN
ENGINEERING COMPANY
Santa Clara, Calif.

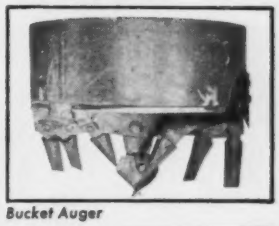
PETERSEN ENGINEERING CO.
Santa Clara, California Dept. 4
Please send me more information on the new Pengo wire stringing equipment.
Name_____
Firm_____
Address_____
City_____ State_____

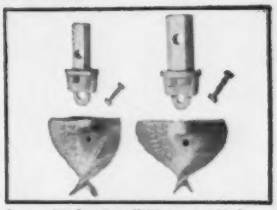
Other PENGO Products include:

24 inch Heavy Duty Flight Auger

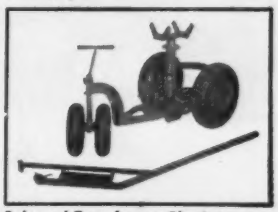
Double-Helix Heavy Duty Auger

Offset Boring Head

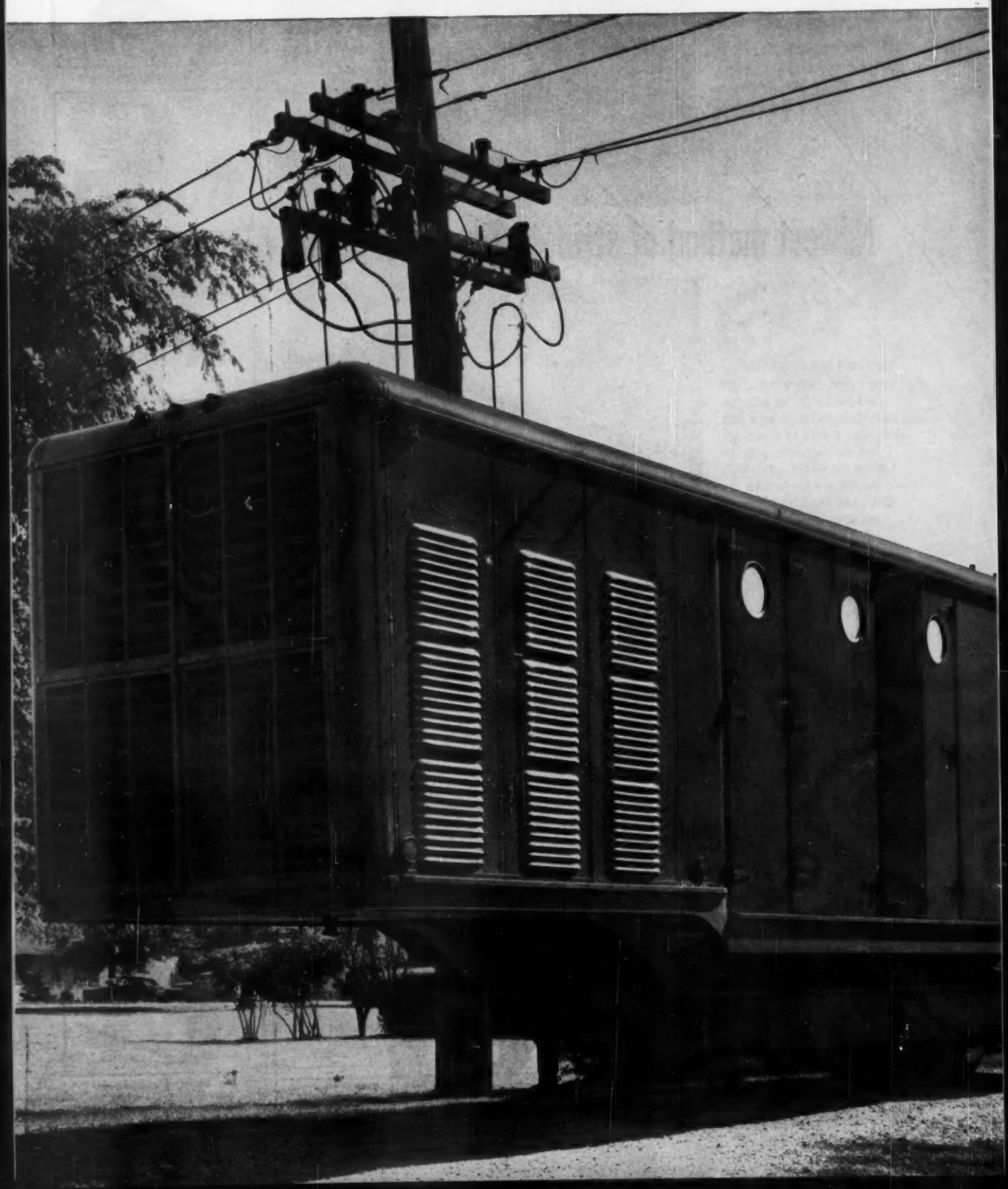

Bucket Auger


Screw Bit for Small Diameter Holes

Pulling Eye


Pole and Transformer Chariot

Line relocation



need not be costly

Not, that is, when work can be completed during regular hours and without interrupting service. And many utilities are doing just that—paring the high cost of line relocation and other maintenance and repair needs—with versatile Electro-Mobile generating units.

For example, a 500 kw trailer like the one shown here can travel most anywhere, pick up a load in minutes. Crews can do their work faster, at lower cost, and all the while *normal service* is maintained.

Further, these units can be utilized as an immediate source of emergency power. Their quick mobility can provide the means to continued service, and continued good public relations.

The economies of Electro-Mobile Power have been demonstrated on many utility applications. Why not ask your Electro-Motive representative to outline briefly ways these trailer units can help improve service and lower costs for your system?

1000 kw units for use on sidings or placed on piers for semi-permanent use.

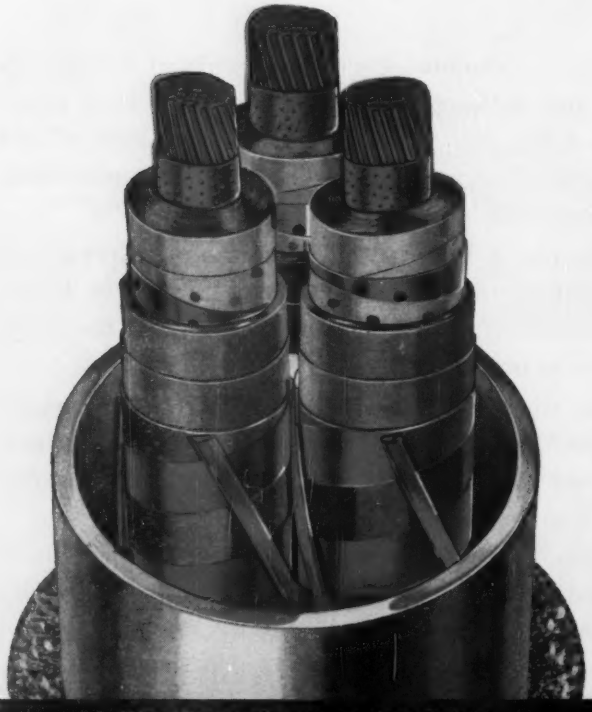
500 kw units offer excellent mobility for many temporary applications.

LIVE BETTER ELECTRICALLY

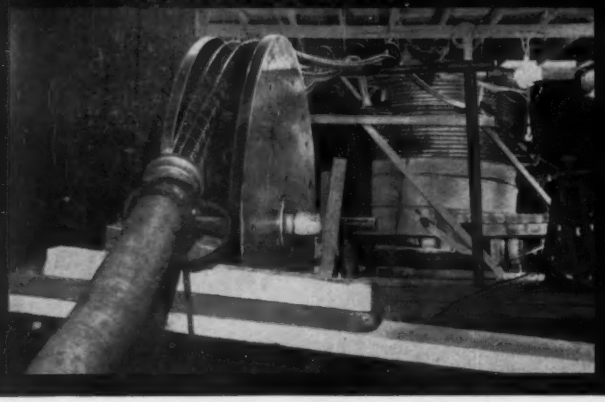
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS
Sales offices in Chicago, New York, St. Louis, San Francisco
In Canada: General Motors Diesel Limited, London, Ontario

Phelps Dodge

WIDEST RANGE OF HIGH



Pipe Type, Compression Cable, from 15 KV to 230 KV.



Low Pressure, Oil-Filled Cable, from 15 KV to 230 KV.

Consult Phelps Dodge for the correct answer to your requirements, regardless of voltage or type!

offers Industry's VOLTAGE POWER CABLE!

Only Phelps Dodge has manufacturing experience and operational "know how" with the entire range of high voltage cables which includes: oil compression, gas compression, high pressure oil, high pressure gas, pipe type cables; medium pressure gas, low pressure oil-filled, low pressure gas, submarine and solid type cables.

Low Pressure, Gas-Filled Cable, from 15 KV to 44 KV.

Submarine Cable, from 15* KV to 35 KV.

Solid Type Cable, from 15* KV to 69 KV.

*Lower voltage cables in this class also available.

PHELPS DODGE COPPER PRODUCTS CORPORATION

300 PARK AVENUE, NEW YORK 22, N. Y.

Panel Mounting that age only makes tougher!

K&M EBONIZED ASBESTOS

A real toughie, K&M Ebonized Asbestos resists shattering, vibration, shock, and temperature changes. Both mechanical and dielectric strengths are high. Yet, it's practical, easy to work, and low-cost.

Its ruggedness comes from the asbestos fibers and portland cement which make it durable and long-lasting. Molded under pressure, it's then impregnated with special insulating compound. Comes in 42″ x 96″ and 48″ x 96″ sheets—⅛″ to 4″ in thickness. You can have it cut to your specific sizes, and beveled, too!

See your K&M Distributor today for complete details, or write to us.

K·M
BEST IN ASBESTOS

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

F FERRANTI

330,000 volts

transformers for Kariba

The contract awarded to Ferranti Ltd. by the Federal Power Board for the great Kariba Hydro-Electric Scheme on the Zambesi River covers two 120,000 kVA 330/234 kV 3-phase auto transformers with separate boosters; eight 60,000 kVA 330/88 kV 3-phase double-wound transformers; and two 60,000 kVA 330/33 kV 3-phase double-wound transformers. All the transformers will be provided with on-load tap changing gear. The placing of this large and important overseas transformer contract emphasises the world-wide confidence in Ferranti Ltd. as builders of fine transformers.

FERRANTI LTD

London Office: **KERN HOUSE · 36 KINGSWAY · W.C.2**
NEW YORK: Ferranti Electric Inc., 30 Rockefeller Plaza, N.Y. 20
TORONTO: Ferranti Electric Ltd., Mount Dennis, Toronto 15

Head Office: **HOLLINWOOD · LANCS · ENGLAND**

PLANTS

MOSTON: Manchester 10, England
WYTHENSHAWE: Manchester 22, England
WEST GORTON: Manchester 12, England
GEM MILL: Chadderton, Lancs., England
EDINBURGH: Ferry Road, Edinburgh 5, Scotland
DUNDEE: Kings Cross Road, Dundee, Scotland

Ever see tougher operating conditions?

Tiger Brand Amerclad is made for this treatment

ON THE TRACK-TAMPING MACHINE shown here, the cable is flexed 4,500 times per minute. Eight powerful vibratory motors are used to drive eight tamping assemblies. Each motor is powered with Tiger Brand Amerclad cable.

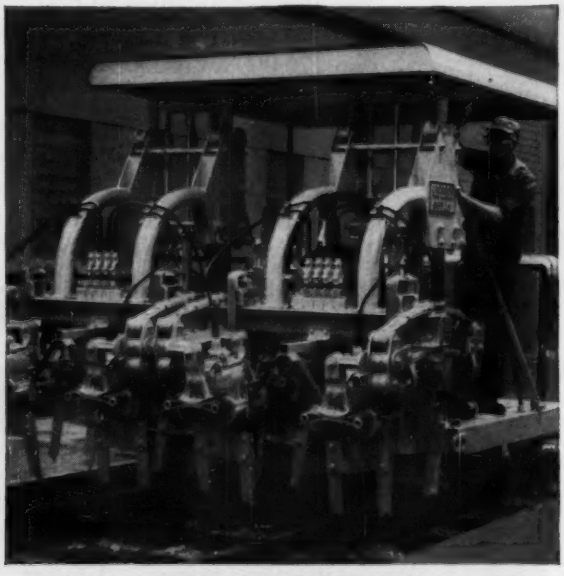
It wasn't always that way. Other cable did a good job—for a while. But the shattering vibration actually caused the jackets to peel away from the conductors. Then Amerclad, with its dynamically balanced conductors and tough, lead-cured jackets, solved the problem. In fact, the manufacturer says, "Tiger Brand is superior to anything we have ever seen for this type of service. It is completely dependable under all conditions."

For an interesting contrast, look at the power shovel pictures, and the three-inch diameter Amerclad. It's the same kind of cable used on the track tamper, only bigger and with more conductors. Operating conditions are different, though. Some of the cable is right in the blast area where it is dragged over sharp rocks and pounded by dynamite-propelled boulders. The cable operates 24 hours a day at temperatures that range from 100° in the shade to minus 40° in shoulder-deep snow.

When you specify Tiger Brand Amerclad, this is the quality you get. We make no second- or third-grade line. *All* Amerclad is made to the same exacting specifications—designed for users who demand the very best because they can't afford expensive down time. Why not call your American Steel & Wire salesman and ask for more information about this quality cable?

American Steel & Wire Division, United States Steel, General Offices: Cleveland, Ohio
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

Notice the long span of the cable bridge and the extreme flexibility of the Amerclad in the foreground. It's the same cable.



Railroad track tamper is a completely self-contained unit. Notice the eight cables which feed separate vibratory motors.

This is a typical power shovel at the mine. The Amerclad runs along the ties and under the tracks.

USS TIGER BRAND ELECTRICAL WIRE & CABLE

a standard Tiger Brand cable for every special job

- Asbestos Wire and Cable
- Mold Cured Portable Cord
- Shovel & Dredge Cable
- Paper & Lead Cable
- Varnished Cambric Cable
- Interlocked Armor Cable
- Special Purpose Wire & Cable
- Aerial, Underground and Submarine Cable

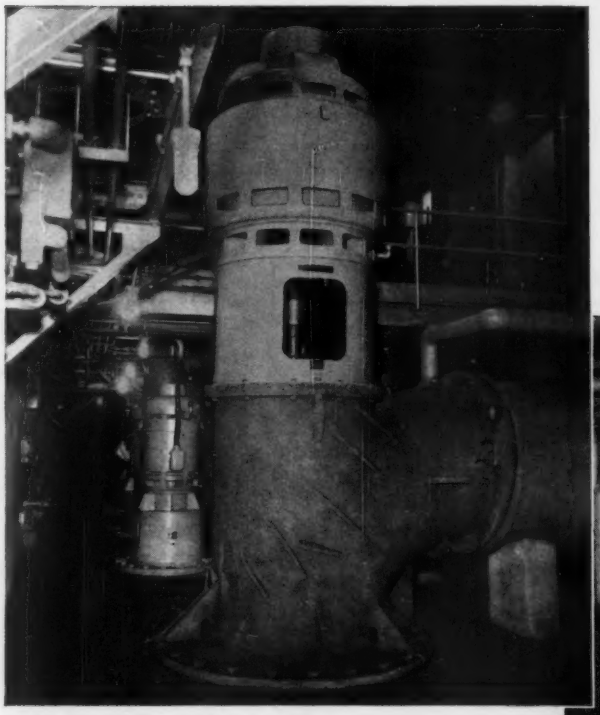
UNITED STATES STEEL

USS TRADEMARK

I-R VERTICAL Pumps

designed and built to meet your specific

CIRCULATING and CONDENSATE application



Ingersoll-Rand Class APM vertical propeller pumps offer many advantages for condenser circulating service. Vertical design with submerged suction simplifies installation and piping... "Pull-Out" construction permits removal of the pumping element for inspection without disturbing the pump mounting or the discharge flange bolting... Discharge can be located above or below floor level... Pumps are self-priming and have only one stuffing box – accessible from floor level and not under pressure... Impeller clearances can be adjusted from top of driver, without disturbing piping...Available in capacities to 150,000 gpm, heads to 50 ft. per stage.

Class APHC vertical turbine-type condensate pumps require very little floor space and permit simple, straight-through piping connections located either above or below floor level . . . Single, readily-accessible stuffing box and top-of-shaft adjustment for rotor clearances simplify maintenance and reduce down-time... All units are self-venting... Impellers are vertically stacked in from 1 to 9 stages, for heads to 575 ft. and capacities to 3000 gpm.

The cost-saving features mentioned above are backed by excellent records of dependable, trouble-free service year after year. That's why more and more power companies are specifying I-R Verticals for circulating and condensate service. Ask your I-R representative for complete details and specifications on the pumps best suited to your needs.

Ingersoll-Rand

10-391

11 Broadway, New York 4, N.Y.

COMPRESSORS • GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS
CONDENSERS • PUMPS • ROCK DRILLS • VACUUM EQUIPMENT

Craftsmanship at Allis-Chalmers

...includes 10 operations to protect

Tank Surfaces

of Distribution Transformers

Advanced engineering, scientific precision and manual skill at Allis-Chalmers extend to every detail of manufacture, including surface finishing. The tank treating process exposes all tank surfaces to five separate chemical and cleaning baths and converts surfaces to a non-metallic phosphate coating.

Synthetic resin base enamel is hot sprayed on tank for both prime and second coat. Both are oven baked. After the transformer is completely assembled it gets its final protective coat of enamel.

This process gives Allis-Chalmers distribution transformers a surface resistant to severest weather conditions, salt and acid atmosphere conditions. The gleaming, gray surface of Allis-Chalmers tanks substantially reduces troublesome corrosion problems.

Extra "Measure" of Corrosion Protection

Magnetic gauging of paint coverage is still another example of the craft and precision in every step of manufacture. Painted tanks are gauged to assure uniform, specified paint thickness when finished.

For the complete craftsmanship story, see your A-C representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5556

US RUBBER CONVEYOR BELTING

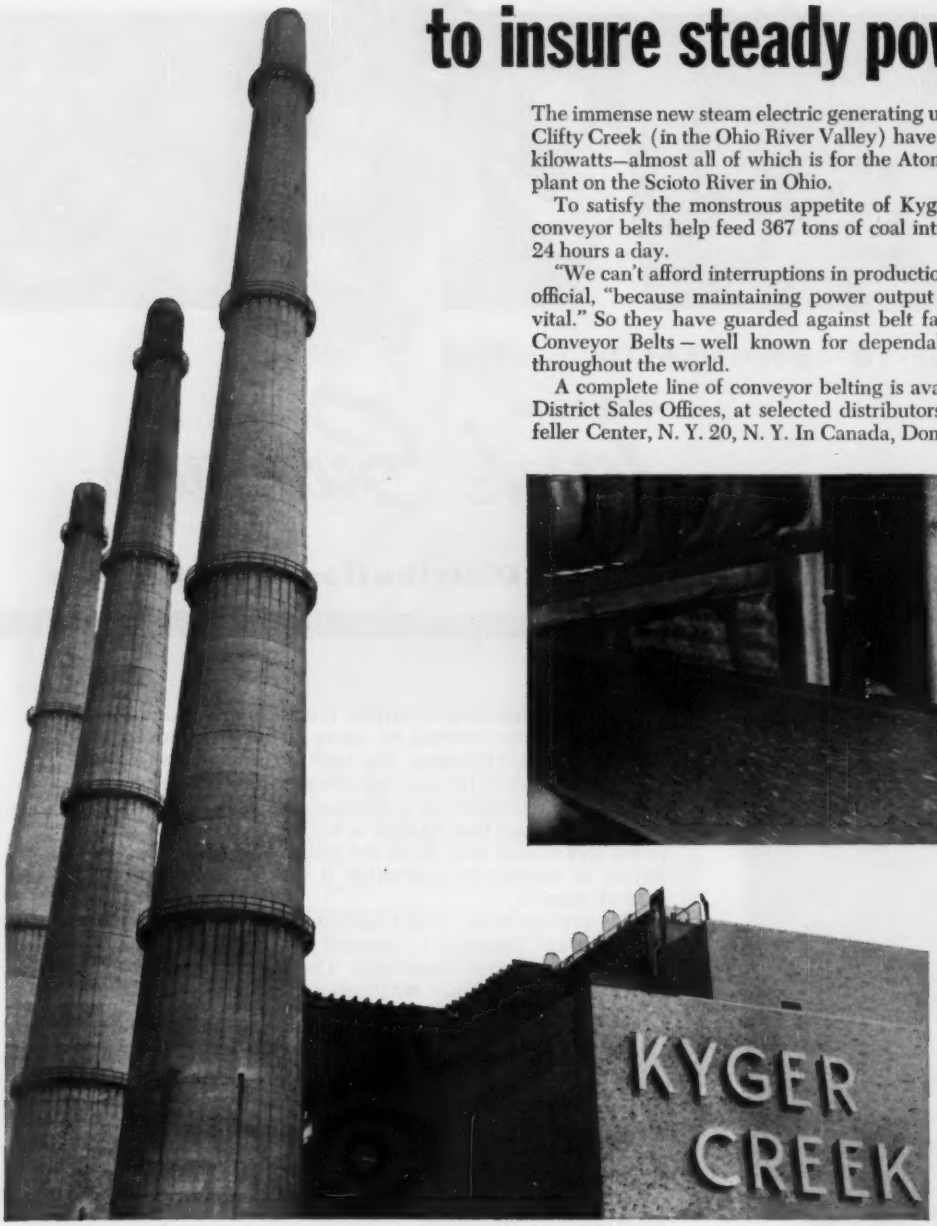
Delivering 367 Tons of Coal per Hour... to insure steady power flow

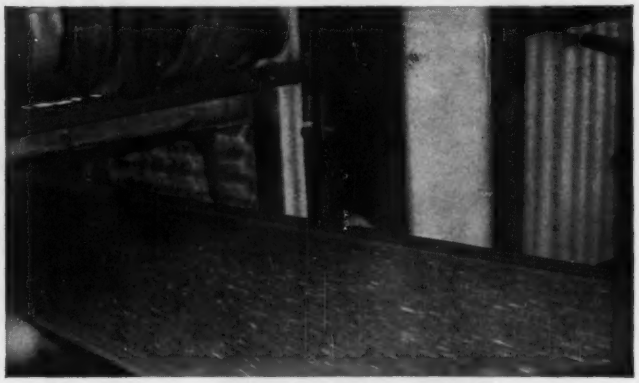
The immense new steam electric generating units at Kyger Creek and Clifty Creek (in the Ohio River Valley) have a capacity of 2,365,000 kilowatts—almost all of which is for the Atomic Energy Commission plant on the Scioto River in Ohio.

To satisfy the monstrous appetite of Kyger Creek, U. S. Rubber conveyor belts help feed 367 tons of coal into its boilers every hour, 24 hours a day.

"We can't afford interruptions in production," says a ranking plant official, "because maintaining power output for the atomic plant is vital." So they have guarded against belt failure by selecting U. S. Conveyor Belts – well known for dependability by power plants throughout the world.

A complete line of conveyor belting is available at the 28 "U. S." District Sales Offices, at selected distributors, or write us at Rockefeller Center, N. Y. 20, N. Y. In Canada, Dominion Rubber Co., Ltd.





(above)
The Number One conveyor belt emerging from the unloader hopper at Kyger Creek. This 48" wide U.S. Matchless® belt provides excellent troughability, extreme rip resistance, fine training and long life. This excellent conveyor system and belting mean considerable savings in manpower to move the coal supply.

US RUBBER Mechanical Goods Division
United States Rubber

Eliminate testing

of molded current transformers

with Westinghouse

FREE CERTIFIED TEST RESULTS

you install...that's all!

Only Westinghouse gives you...

FREE CERTIFIED

You need never acceptance-test

TEST RESULTS

another molded current transformer

SAVE TIME AND MONEY . . .

Westinghouse Certified Test Results mean that you need never *acceptance-test* another molded current transformer. This is because every Westinghouse molded current transformer is pretested *before* it is shipped. Further testing is completely eliminated . . . you install—that's all. In addition to saving time and money for you, Certified Test Results are your guarantee that when you install Westinghouse molded current transformers, you install top quality.

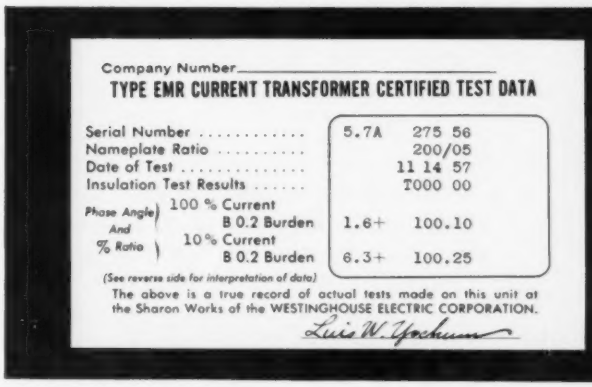
Westinghouse — and only Westinghouse — gives you Certified Test Results on its complete line of molded current transformers.

FOR YOUR FILES . . .

You receive for your files a 3 x 5 file card with the specific test data on every molded current transformer you purchase. This, again, eliminates another step for you when you buy Westinghouse molded current transformers.

These Certified Test Results should satisfy your state PUC requirements.

Molded current transformers being tested on the new Westinghouse automatic test installation at Sharon, Pennsylvania. Here is another example of Westinghouse plowing back earnings into development . . . saving you time and money by eliminating testing.



Company Number_____

TYPE EMR CURRENT TRANSFORMER CERTIFIED TEST DATA

Serial Number		5.7A	275 56
Nameplate Ratio			200/05
Date of Test			11 14 57
Insulation Test Results			T000 00
Phase Angle And % Ratio	100 % Current B 0.2 Burden	1.6+	100.10
	10 % Current B 0.2 Burden	6.3+	100.25

(See reverse side for interpretation of data)

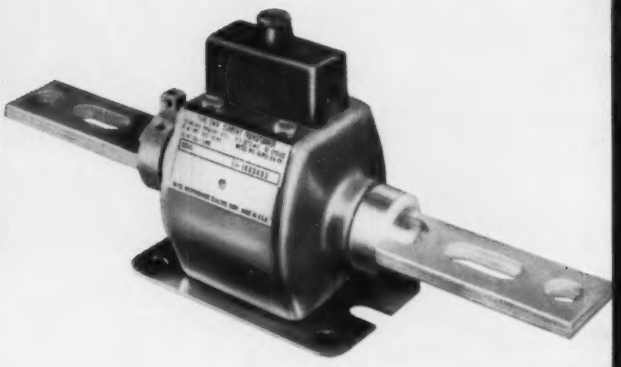
The above is a true record of actual tests made on this unit at the Sharon Works of the WESTINGHOUSE ELECTRIC CORPORATION.

Luis W. Yochum

YOU CAN BE SURE... IF IT'S Westinghouse

THEY ALL HAVE IT . . .

All Westinghouse molded current transformers carry the Certified Test Results record. This includes the SM line, molded of silicone rubber, and the 600-volt class, molded of polyester elastomer, a product of Westinghouse research.



The EMO and EMR 600-volt class transformers are four ways superior to any comparable units:

- 50% greater cable capacity—with obround primary opening on the EMO.
- Positive, permanent connections—exclusive Ilsco-type secondary terminals with weatherproof covers.
- Longer life—polyester gives outstanding protection against weather and corrosive acid or alkali fumes, as well as outstanding resistance to deterioration caused by oil.
- Smaller, lighter—polyester molding, plus the new design, gives you reduced size and weight . . . simplifying installation.

REMEMBER . . .

- You eliminate all testing of these transformers when you buy Westinghouse.
- You receive specific test data about the molded current transformers you purchase from Westinghouse, at no extra cost.
- You install—that's all—when you purchase Westinghouse molded current transformers.
- You receive . . . on the EMO and EMR current transformers . . . four extra features of superiority.

For full details on Certified Test Results call your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE...IF IT'S Westinghouse

230-kv Tie Line Links Duke Power Steam Plants

12.5-mi line nearly completed late in '57; sixty-eight steel towers connect Allen and Riverbend plants

There's plenty of activity in Duke Power Company's territory these days. Industry is growing fast in the Piedmont areas of North and South Carolina, and with it the demand for electric power. The Charlotte, N. C., utility sold over 10 billion kilowatt hours of electric energy in 1956, a 207 pct increase in ten years.

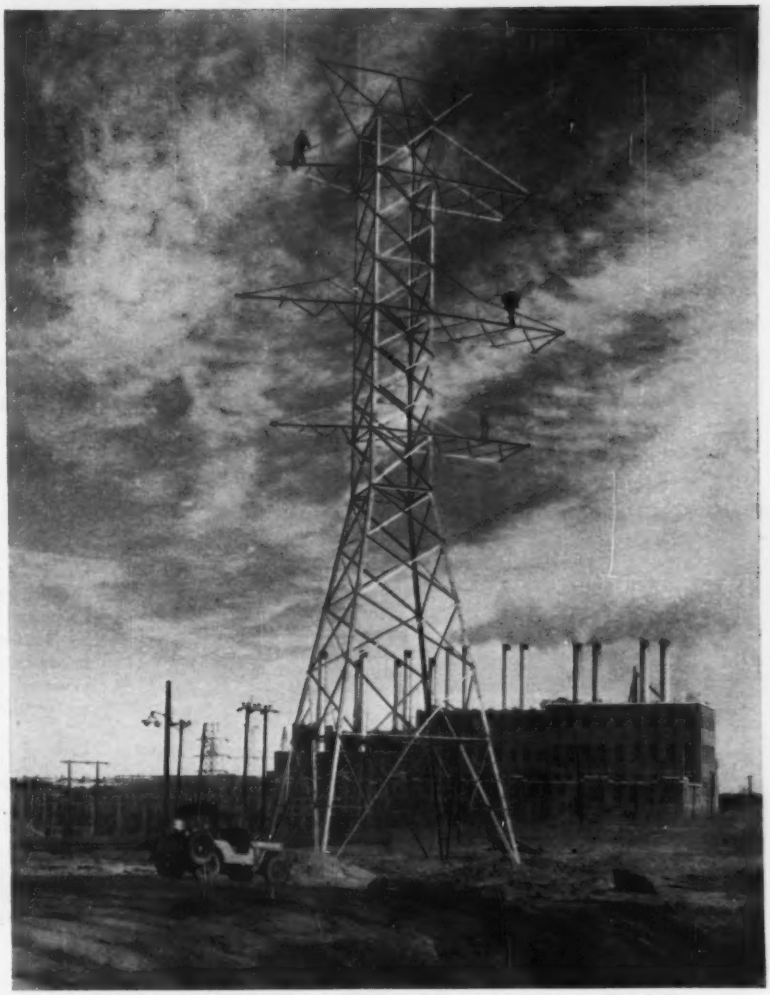
Keeping pace with zooming requirements has kept Duke Power on its toes. They spent $22.5 million for new steam electric generating capacity in 1956, about $58 million in 1957, and expect to spend another $66 million in 1958.

350,000-KW ALLEN PLANT . . . Newest generating facility in the Duke Power system is the Allen Plant, on Catawba Lake, the site also of a hydroelectric plant. Two units each with a continuous capability of 175,000 kw give the plant an initial capacity of 350,000 kw. The ultimate capacity is to be 1 million kilowatts at a total construction cost of over $100 million.

TIE LINE TO RIVERBEND . . . An important phase of the Allen construction program has been installation of a 12.5-mi tie line to the Riverbend Steam Station. This 230-kv line required 68 galvanized steel towers, all designed and supplied by Bethlehem Steel. Although the towers are of double-circuit construction, only one circuit is being installed initially.

The line's conductors are 54/19 1,272,000-CM ACSR, strung for a final maximum tension of 16,500 psi when loaded with ½-in. ice and 8 psf wind, at 0 deg F.

SPECIAL STEEL CUTS COST . . . A key aspect of tower design was in the use of high-strength, low-alloy steel for corner legs and other large members. This meant weight reductions up to 5 pct, resulting in a lower erected cost for the structures.



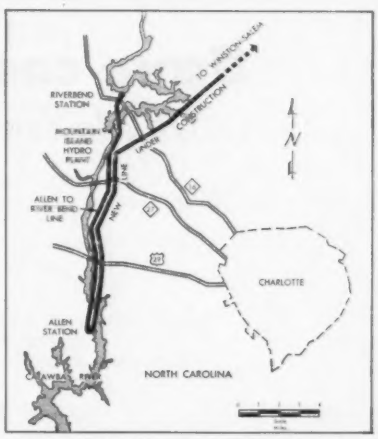
This angle tower weighs over 23 tons, including stub angles, and is about 130 ft high. It is the last tower on the Allen-Riverbend line. The Riverbend Steam Station is in the background.

The standard suspension tower is 120 ft 6 in. high and weighs 10.5 tons including steel anchors. Average span length is 1100 ft on the tangent. The towers were supplied with variable leg extensions.

FABRICATED AT LEETSDALE . . . All 68 steel towers were detailed, fabricated and galvanized at our big tower shop at Leetsdale, Pa., near Pittsburgh.

West Coast tower requirements are handled at Bethlehem Pacific Coast Steel Corporation shops in South San Francisco, Calif., and Seattle, Wash.

If you're in the market for transmission towers and switching structures, our nearest sales office will gladly give you more information about our ability to design and supply all your requirements.

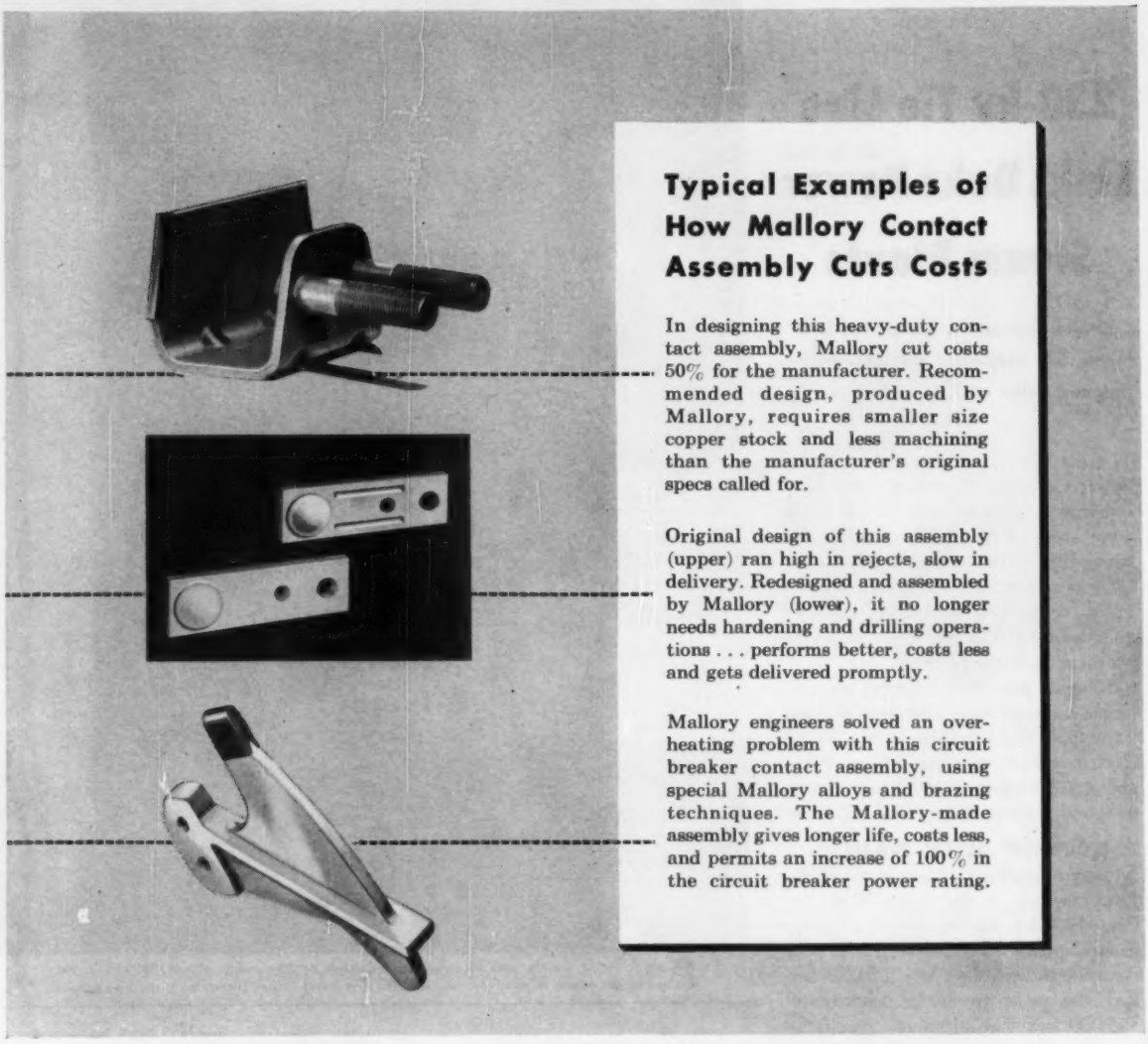


The map shows the route of the 12.5-mi line along the Catawba River. Another 230-kv line, for which Bethlehem is also supplying the towers, is being constructed to Winston-Salem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation.

BETHLEHEM STEEL



Typical Examples of How Mallory Contact Assembly Cuts Costs

In designing this heavy-duty contact assembly, Mallory cut costs 50% for the manufacturer. Recommended design, produced by Mallory, requires smaller size copper stock and less machining than the manufacturer's original specs called for.

Original design of this assembly (upper) ran high in rejects, slow in delivery. Redesigned and assembled by Mallory (lower), it no longer needs hardening and drilling operations . . . performs better, costs less and gets delivered promptly.

Mallory engineers solved an overheating problem with this circuit breaker contact assembly, using special Mallory alloys and brazing techniques. The Mallory-made assembly gives longer life, costs less, and permits an increase of 100% in the circuit breaker power rating.

Save costs, handling, scheduling

. . . let Mallory design and assemble your contacts

Many major electrical equipment manufacturers gain savings while improving their products through Mallory's complete contact assembly facilities. You can, too. Let Mallory do the whole job—from design and material selection, to fabrication and finishing of parts, to final assembly. It's the logical way to break production and delivery bottlenecks, and cut contact costs right down the line.

A Mallory engineer will be glad to discuss your particular problem. Write or call today . . . and send for your copy of the new Mallory booklet on contact cost-cutting ideas.

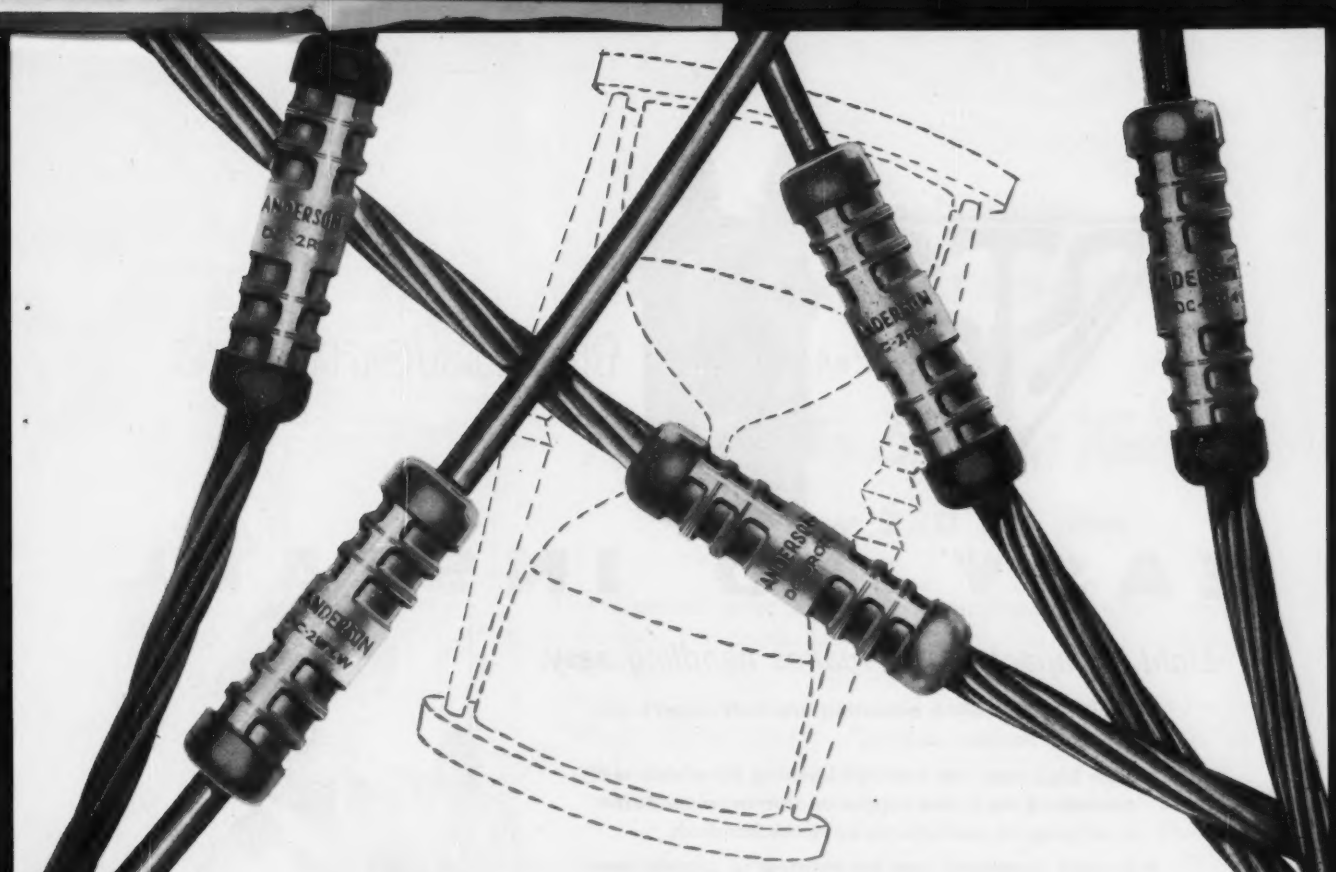
Expect more . . . get more from

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO. Inc., INDIANAPOLIS 6, INDIANA

For information on titanium developments, contact Mallory-Sharon Metals Corporation, Niles, Ohio.



DURABLE

SERVICE ENTRANCE CONNECTIONS with ANDERSON DURA-CRIMP COMPRESSION SLEEVES

High conductivity! Quick, simple and easy installation!
Compact and neat! Wide range of conductor combinations!

Anderson Dura-Crimp Compression Sleeves are plainly marked to show (1) die size, (2) die press area, (3) catalog number and (4) complete cable size application. 5/8" O.D. line consists of 17 sizes to accommodate all combinations of Aluminum, ACSR and Copper conductors from #8 AWG to 1/0 AWG. 1/2" O.D. line, 14 sizes for all combinations of Aluminum, ACSR and Copper conductors from #8 AWG to #2 AWG.

Caps, color coded to indicate cable size, are easily removed or punctured by cable.

Anderson's exclusive inhibitor increases conductivity and pull-out strength. The inhibitor's correct distribution in both grooves is assured by a solid, built in center, which also insures correct cable length in each groove and prevents direct cable contact.

Contact your ANDERSON Representative for complete details . . . or write to our home office.

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES
for SUBSTATION • TRANSMISSION • DISTRIBUTION

ANDERSON ELECTRIC
CORPORATION
BIRMINGHAM 1, ALABAMA

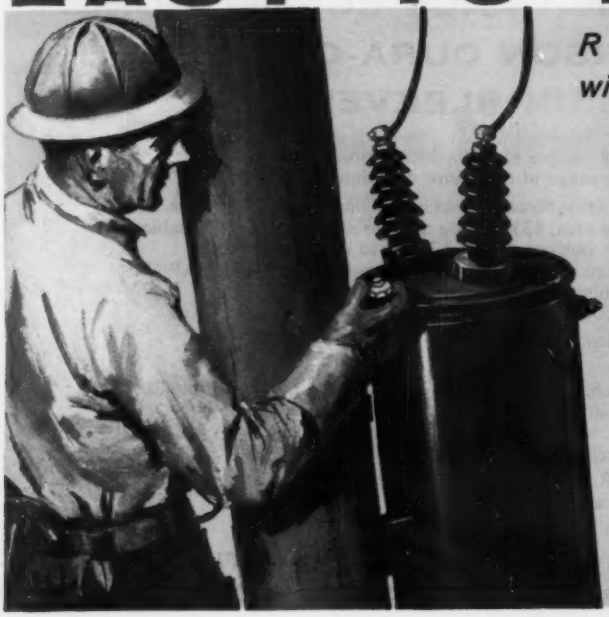
transformers

EASY TO INSTALL

Light, compact design makes handling easy.

- **Standard EEI-NEMA mounting brackets.** Upper bracket on tank has jump proof lug.
- **Both high and low voltage bushing terminals will accommodate either copper or aluminum conductor** in full range of sizes required by NEMA Standards.
- **Ground connector can be rotated** to provide three possible ground wire entrances.
- **Locked type secondary bushings** provide safe, speedy hookups.

EASY TO MAINTAIN

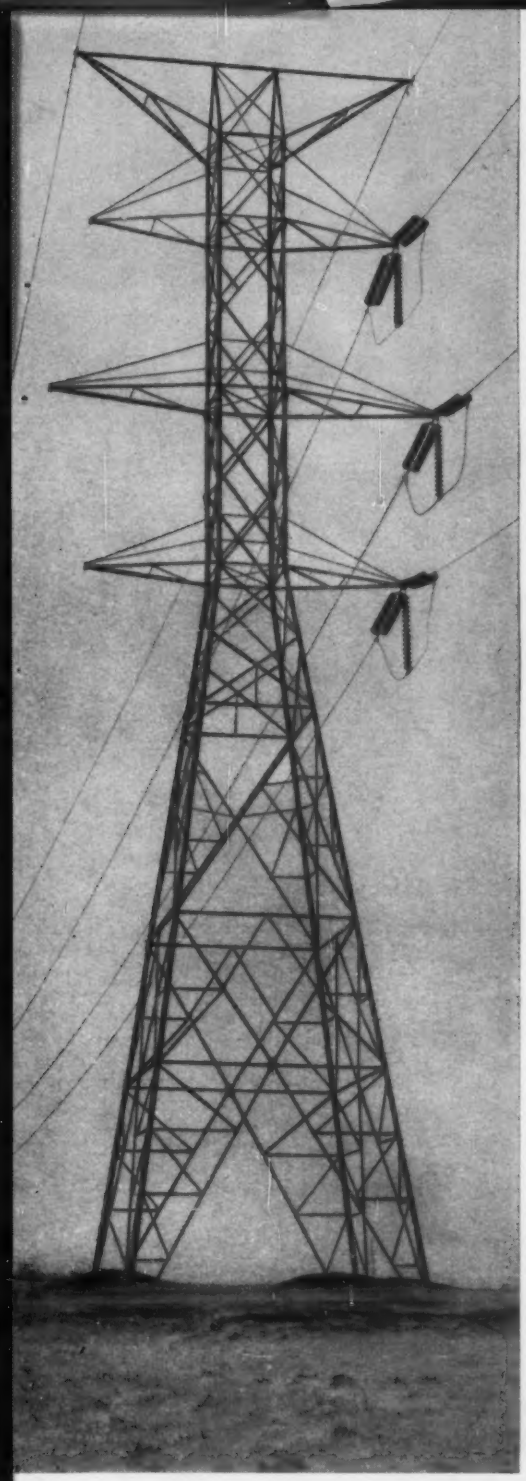


R T & E's new transformers are loaded with features to minimize maintenance.

- **Externally operated tap changer** eliminates entering tank; handle is marked for easy identification of tap position. Taps can be changed readily without disturbing transformer seals.
- **Terminal failures due to stress corrosion are minimized** by use of special aluminum bronze alloy terminals.
- **Band type cover clamp** and tank cover can be removed as a single unit.
- **Completely "Weather Protected" to resist corrosion** by three coats of baked on modified alkyd paint, arc welded seams, stainless steel band type cover clamp and stainless steel mounting pads.
- **Inhibited Oil—(D.B.P.C.) effectively increases transformer life** up to 15 times by reducing sludging.
- **Locked type secondary bushings** will not turn when line leads are attached thus maintaining tight gasket seal.

equipment to help provide power for America

R T & E CORPORATION
WAUKESHA, WISCONSIN



New York State Electric & Gas Corporation erects *54 More* *American Bridge Towers* on new 230 kv line

THIS tall tower is one of 54 recently designed and fabricated for New York State Electric & Gas Corporation, Binghamton, N. Y., an American Bridge customer for 17 years.

These towers which average 118′ in height comprise a 9-mile stretch of that company's Gardenville-Perry 230 kv line. The tallest tower is 128′; the longest span is 1,270′.

Of the 600 tons of steel used in the 54 towers, about 180 tons, or 3⅓ tons per tower, for all main legs and some of the main bracings, was fabricated of USS MAN-TEN. The use of this high strength steel saved over ½ ton per tower or about 30 tons in all . . . with appreciable savings in freight and erection costs.

The Finest Towers at the Lowest Possible Price!

Since 1911, American Bridge has maintained a modern plant which specializes in the fabrication of electric transmission towers, substations and similar structures. Our towers are designed for the specific conditions of loading expected on your line. Generally, all tower members are made alike on all four sides to facilitate erection. Even the bolts which we furnish are of the same diameter, and they are sorted, packed and marked so that no time is lost in looking for the right fastenings. Every member is stamped in the steel to coincide with easily read erection drawings. And, because our towers are galvanized *after* fabrication by the hot-dip process, their protective coating lasts for years.

For more information about our ability to save you money on your tower requirements, just contact the nearest office.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION • GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in: AMBRIDGE • ATLANTA • BALTIMORE • BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • ELMIRA • GARY
HOUSTON • LOS ANGELES • MEMPHIS • MINNEAPOLIS • NEW YORK • ORANGE, TEXAS • PHILADELPHIA • PITTSBURGH • PORTLAND, ORE. • ROANOKE • ST. LOUIS • SAN FRANCISCO • TRENTON
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN BRIDGE
Transmission Towers

UNITED STATES STEEL

"Here's a really USABLE PLIER"

Says Ray Lindner of Buffalo, N. Y., recognized as the expert mechanic who can "fix it" when others fail. Mr. Lindner has been a mechanic for 40 years and owner and operator of Lindner's Garage for 33 years.

"CRESTOGRIP" PLIER No. P210. Retails for $3.00. If your hardware dealer can't supply you, order from the factory. $3.00 postpaid.

GET YOUR COPY!

Ideas and guidance for the professional and amateur mechanic. Forty pages of *help*... profusely illustrated. Proven ways of doing it easier with good hand tools. A new and revised edition of a "how-to-do-it booklet" that mechanics and industrial arts teachers by the tens of thousands have endorsed. Send 10¢ to cover postage, or GET A FREE COPY with the purchase of *any* CRESCENT TOOL. Ask your local hardware dealer. This offer is limited to the continental U. S. A. SEND A DIME TODAY! OR ASK YOUR HARDWARE DEALER FOR YOUR FREE COPY as explained above.

"This CRESTOGRIP Plier grips better with less handle pressure than any utility plier I have ever used. Its box joint is the reason. Ordinary lap joints generate much more frictional resistance. Crescent's box joint is not only smoother working but much stronger. It's easy to adjust, easy to use...a really different and better tool!"

QUICK, POSITIVE ADJUSTMENT

This cut-away view shows joint construction with its extra generous bearing surface at the arrow point.

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

POWERS *American*

SERIES LM-4

"Load-Master"

HYDRAULIC CRANE

Saves time and manpower because it speeds up loading and unloading jobs... handles work normally requiring several specially-equipped vehicles.

Load-Master lifts a 4000 lb. load with ease... moves it safely and quickly under the most adverse job conditions. Power is derived from a heavy-duty hydraulic pump driven by the truck engine. Controls are located in a position which gives operator full view of the crane at all times.

Operator has absolute control of load at all times. The hydraulic system requires intentional movement of control levers before load position can be changed... and the load cannot drop if the truck engine stalls.

OPERATING FEATURES: Telescopic-type hydraulic boom can be spotted at any point from horizontal position to an 85° angle of elevation; hydraulically-powered mast will turn 360° in either direction; specially-designed winch, driven by a hydraulic motor, is grooved to wind cable evenly; hydraulic outriggers, with swivel-mounted foot plates, furnish extra side stability.

Load-Master is ideally suited for use with the Powers-American Series 300 Body shown above. It can also be furnished with bodies of other types... or shipped for mounting in your shop or local garage.

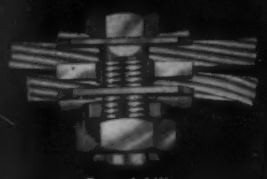
Price information and descriptive literature will be sent upon request.

Load-Master can be used for setting poles up to 45′ in length. It requires only 20″ of mounting space behind the truck cab. Boom extensions to 22′ can be furnished.

McCABE-POWERS AUTO BODY COMPANY

5900 NO. BROADWAY
ST. LOUIS 15, MO.

625 CEDAR STREET
BERKELEY 10, CALIF.



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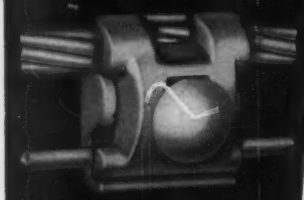

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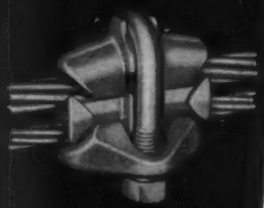

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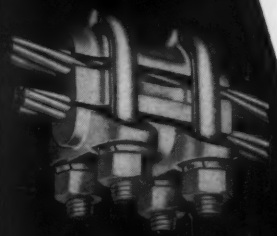
Type W



Type 2U AA

Type PAA 400

There's a BLACKBURN clamp for every ALUMINUM CONNECTION

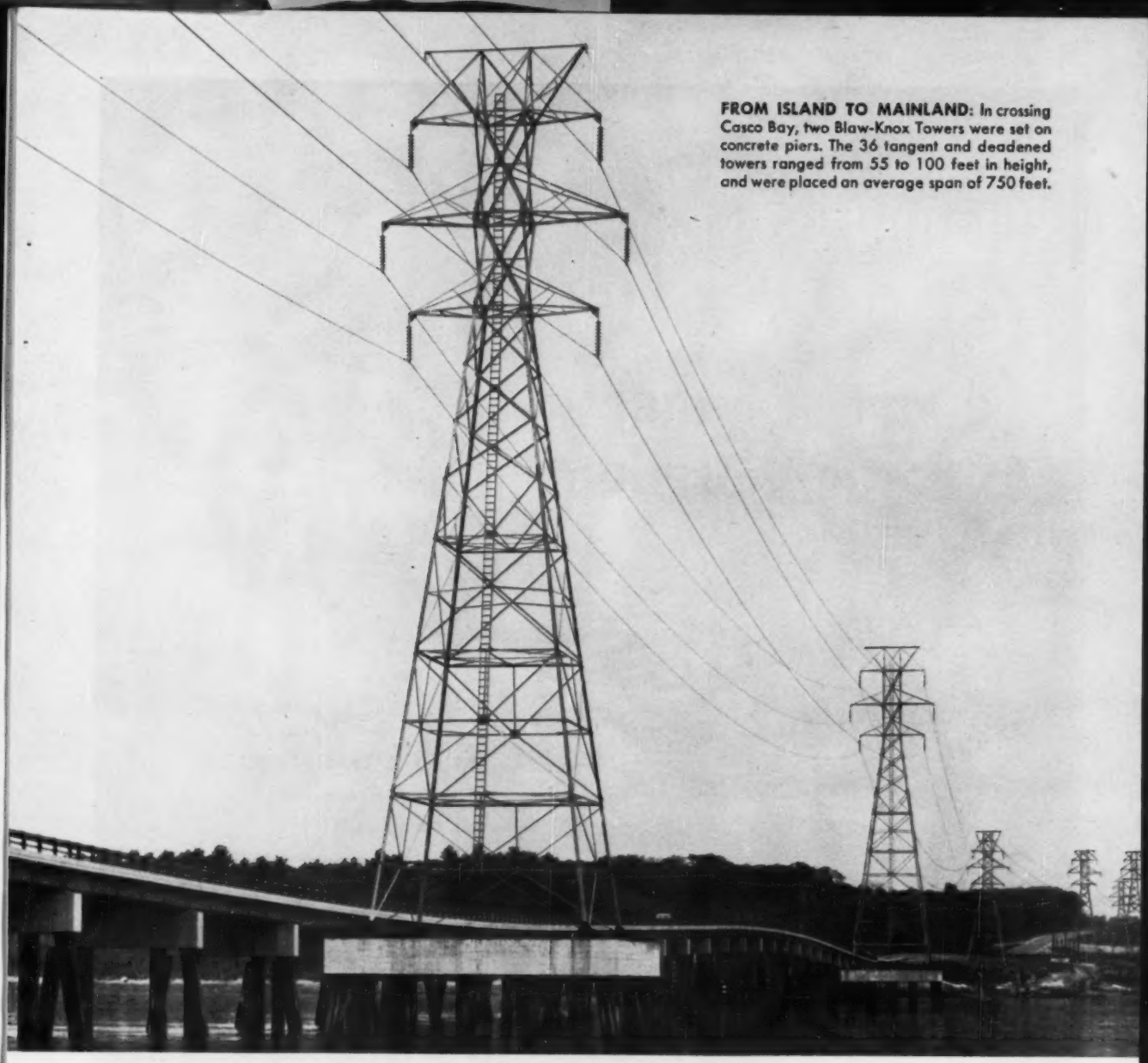
Always Use Blackburn Aluminum Fittings When Terminating or Joining Aluminum Conductors

- Each clamp accommodates a wide range of conductors.
- Castings are high-strength, corrosive-resistant, heat treated aluminum alloy.
- Blackburn special surface treatment eliminates production oxides and improves conductivity.
- Bell contoured grooves protect conductors. Clamping forces are distributed over extra-large contact area.
- Available with galvanized steel or aluminum hardware. Aluminum hardware is alumilited to prevent seizing.
- Can be quickly and easily installed with regular linemen's equipment. No special tools required.

IMPORTANT: We recommend the use of CONTAX on all aluminum connections. CONTAX is an oxide inhibiting compound with an ASTM drop point of 549° F.

BLACKBURN *Aluminum* FITTINGS

JASPER BLACKBURN CORPORATION
1525 Woodson Rd., St. Louis 14, Mo.,
Wydown 3-9430



FROM ISLAND TO MAINLAND: In crossing Casco Bay, two Blaw-Knox Towers were set on concrete piers. The 36 tangent and deadened towers ranged from 55 to 100 feet in height, and were placed an average span of 750 feet.

Central Maine chooses Blaw-Knox Towers to carry lines from new Cousins Island Plant

The new Yarmouth Steam Plant—the newest and potentially the largest in Maine—is the latest development by Central Maine Power Company to meet the increased needs of its growing number of customers. The new showcase plant will use two 44,000 kw turbine-generators along with the latest and largest transformers and condensers in the state.

To carry the 115,000 volt lines from Cousins Island to the Moshers substation in Gorham, Blaw-Knox designed and fabricated 36 steel transmission towers. Working with Central Maine's engineers Blaw-Knox was able to bring over 40 years of transmission tower experience to the job. Basic concepts evolved from this extensive experience are used to build towers that are superior in strength, simpler to erect, easier to modify.

See how this background can pay off in meeting your own tower requirements. For details, send for Folder 2509 and tell us your needs. We'll gladly give you our recommendations and a quotation.

Transmission Towers—Steel Transmission towers, custom-built for each installation . . . multi-circuit and other special structures . . . and antenna towers, guyed and self-supporting types for AM • FM • microwave • communications • radar • parabolic antennas

BLAW-KNOX

BLAW-KNOX COMPANY
Equipment Division
Pittsburgh 38, Pennsylvania

PREFORMED ARMOR RODS
increase uninterrupted service life of conductor

The wind blows, the conductor vibrates and the life of your line is at stake. If the vibration problem is such that severe frequency and amplitude conditions are sufficiently prolonged, the conductor could begin to break regardless of the protective armor used. And, if the conductor begins to break, PLP Preformed Armor Rods have a big advantage over other armor: The rods undertake the function of an electrical and mechanical repair splice.

All armor rods greatly reduce vibration stresses, but if vibration is severe enough to cause strand breaks, other types will not prevent parting of the strands. With PLP (short pitch) Preformed Armor Rods, it's a different story; the conductor is held tightly and uniformly throughout the entire length of the rods—not at one point. You have a long, firm grip that never relaxes, that maintains conductivity in spite of the break. Thus, your line continues to function unimpaired.

There is one other Preformed advantage to keep in mind. Some types of armor require the use of bolted end-clamps that can shake loose and cause chafing. Preformed Armor Rods require no end-clamps.

For a long uninterrupted service life, Preformed Armor Rods are the best suit of armor your conductor can wear. PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland . . . in 10 years the leading manufacturer of armor rods, dead-ends, Guy-Grip dead-ends and other line accessories.

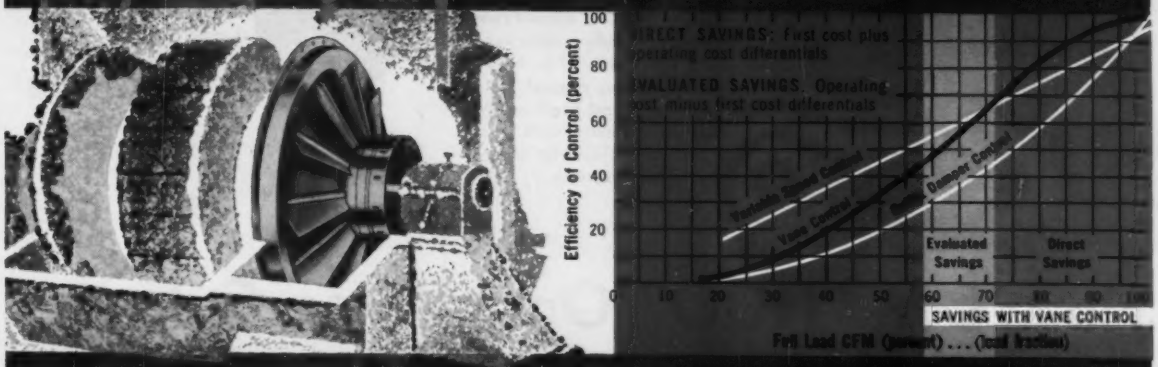
PLP

You can look up to **Preformed**

Made in accordance with or for use under U. S. Patent Nos. 2,609,653; 2,275,019 and 2,587,521. Other patents pending.

DON'T SPEND $12,000 ON A $4,000 JOB

and still lose money on operating costs!



Westinghouse Inlet Vane Air Spin Control
is the best way to regulate forced and induced draft fan volume with constant speed motors

* Lower First Cost * Lower Operating Costs * High Efficiency

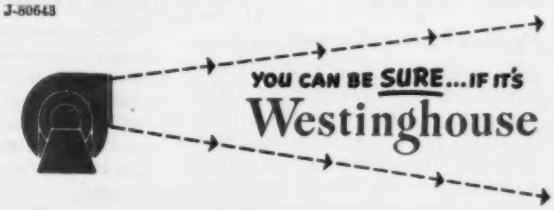
Specify this simple, reliable and mechanically foolproof regulator of fan output for your combustion control. Action is smooth. Response to exact pressure and volume requirements is instantaneous, adjustment precise.

Westinghouse Vane Control can be used on Forced and Induced Draft! Available in distinct designs for clean air forced-draft and coal-fired induced-draft applications.

Hundreds of power plants are benefiting from the economy and effectiveness of Westinghouse Inlet Vane Control on Forced and Induced Draft Fans.

Call your local Sturtevant Division Sales Engineer today, or write Westinghouse Electric Corporation, Dept. A-15, Hyde Park, Boston 36, Massachusetts.

J-80643



L-M's "HDO" open-type cutouts provide greater system reliability. The bird-proof design, rugged construction, and high interrupting capacity built into the cutout assure long, trouble-free service.

How L-M "HDO" Open-Type Cutouts Handle Both High and Low Faults

L-M's controlled double-venting principle provides positive pressure control—an outstanding advance in fuse cutout design.

by **M. L. FENNIG**
Sales Application Engineer,
Protective Equipment,
Line Material Industries

Fuse cutout design has always been something of a compromise. To assure expulsion of arcs from low-amperage faults, the tube must provide small volume to build ample pressure. Yet this same tube is subject to sudden rupture from the rapid development of large gas volumes from high-amperage arcs. L-M's controlled double-venting principle provides the best solution to this problem known at the present time.

Positive Pressure Control

A unique feature of L-M's "HDO" cutout is the pressure-controlled double-venting cap. On low-amperage faults, gases are vented from the bottom of the tube only. This allows sufficient pressure to build up in the tube to assure consistent, reliable arc interruption of faults of the smallest magnitude.

On high-amperage faults, where pressure relief is needed, the diaphragm in the heavy-duty cap opens at the top to allow double venting. The double venting reduces the stress on the cutout, eliminating the possibility of bursting the tube on high-amperage faults. This assures dependable operation, and greater safety for the lineman. Gases from the top are vented vertically to avoid gases from the bottom. This minimizes possibility of contact flashover.

L-M's "HDO" cutouts are strong, durable and easy to operate. They provide the greatest system reliability and lowest operating and maintenance cost of any cutout on the market today. Here's why.

Lower Resistance Path

All current-carrying parts are made of heavy-duty solid copper or copper alloy and are silver-plated to assure cool operation even after many years of service. In addition, the "HDO" has a minimum number of current-interchange points in the circuit, from line lead to the load lead. This provides ample capacity without overheating for years to come.

Greater Resistance to Corrosion

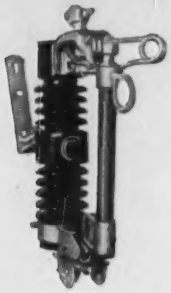
L-M uses high-strength, low-alloy corrosion-resistant steel, such as Cor-Ten, for all non-current-carrying parts, except the hanger. Cor-Ten steel has a yield point at least 1½ times that of structural steel and about twice that of mild carbon steel. Its ability to withstand atmospheric corrosion is 4 to 6 times greater than mild steel.

The results of a 16-year test, shown in the curves, prove the superior corrosion resistance of the low-alloy corrosion-resistant steel hardware furnished with L-M's "HDO" cutout.

Other Outstanding Features

- The "HDO" offers many other desirable features:
- Top contacts and center hanger mounting have through-bolts with insulated heads to provide complete bird-proof protection.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY



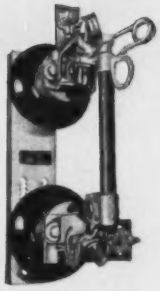
Distribution Class Single Insulator Type

L-M's standard mounting "HDO" cutouts are rugged, easy to operate with hook-stick. All current-carrying parts are silver-plated to assure cool operation.

Two Insulator Type

Distribution post insulator mounting of L-M's "HDO" cutouts provides additional creepage distance for applications in industrial and coastal areas.

Complete Line of Open-Type Cutouts from 5.2 kv to 27 kv

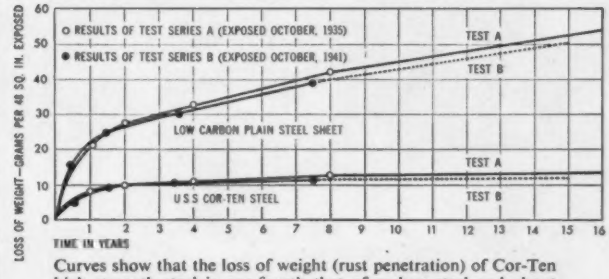


Power Class

Substation mounting is also available. L-M's "HDO" cutouts provide high interrupting capacity, economical fuse replacement, easy operation with a hook-stick and long life.

Load Break

Easy pulling action of interchangeable load-break cartridge will break the link. Arc interruption is completed inside the tube, assuring fast, safe switching of either inductive or capacitive load currents. Available in 5.2, 7.8, 15 and 27 kv ratings.



Curves show that the loss of weight (rust penetration) of Cor-Ten high strength steel is one-fourth that of carbon steel and about one-third that of copper steel after 16 years exposure to *severe* industrial atmospheric conditions. Steel of this type is used for all non-current-carrying parts of the "HDO" except the hanger.

COR-TEN is a registered trademark of U. S. Steel Co.

SIZES AND RATINGS

Cartridges	Interrupting Capacities, Amperes 5.2 KV	7.8 KV	15 KV	27 KV
Normal-Duty Single Venting (Solid Cap)	3000 A.	3000 A.	2000 A.	1200 A.
Heavy-Duty Double Venting (Heavy-Duty Cap)	6000	6000	4000	4000
Heavy-Duty Single Venting (Solid Cap)	5000	5000	4000	
Extra-Heavy-Duty Double Venting (Heavy-Duty Cap)	10000	10000	8000	

- All cartridges are designed for easy hook-stick removal and replacement.
- Top contacts are husky, hard-drawn copper, silver-plated. They serve as guides so the tube cannot miss top contacts.
- Cartridge is firmly anchored; the tube cannot move upward, even when it is accidentally closed in on a fault, within its rating.
- Cutout interrupts any fault current, from minimum melting of link to maximum interrupting capacity of cutout, *with any size link*.

Complete Line of Cutouts

L-M offers a complete line of cutouts in 5.2, 7.8, 15 and 27 kv classes, with a full line of fuse cartridges in normal, heavy, and extra heavy-duty interrupting rating, switch blade, and interchangeable load-break cartridges. All cartridges (except the 27 kv) use standard 20-inch distribution fuse links.

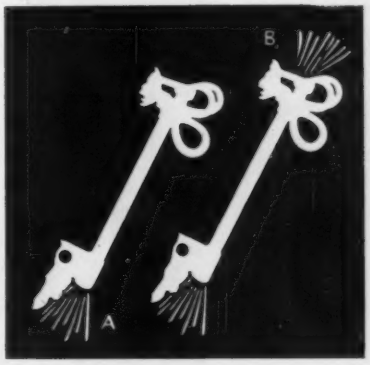
Interchangeable Load-Break Cartridge

Line Material's "HDO" open-type cutout has optional interchangeable load-break cartridges available in each voltage class and interrupting rating.

A pulling force of less than 30 pounds is required to break the largest size link. The cartridge is designed to interrupt all capacitive and inductive loads up through 100 amperes and to completely extinguish the load current in the tube. With L-M's simple load-break device you can switch loads or sectionalize distribution circuits quickly and easily with very little increase in your cutout investment.

Get Complete Information

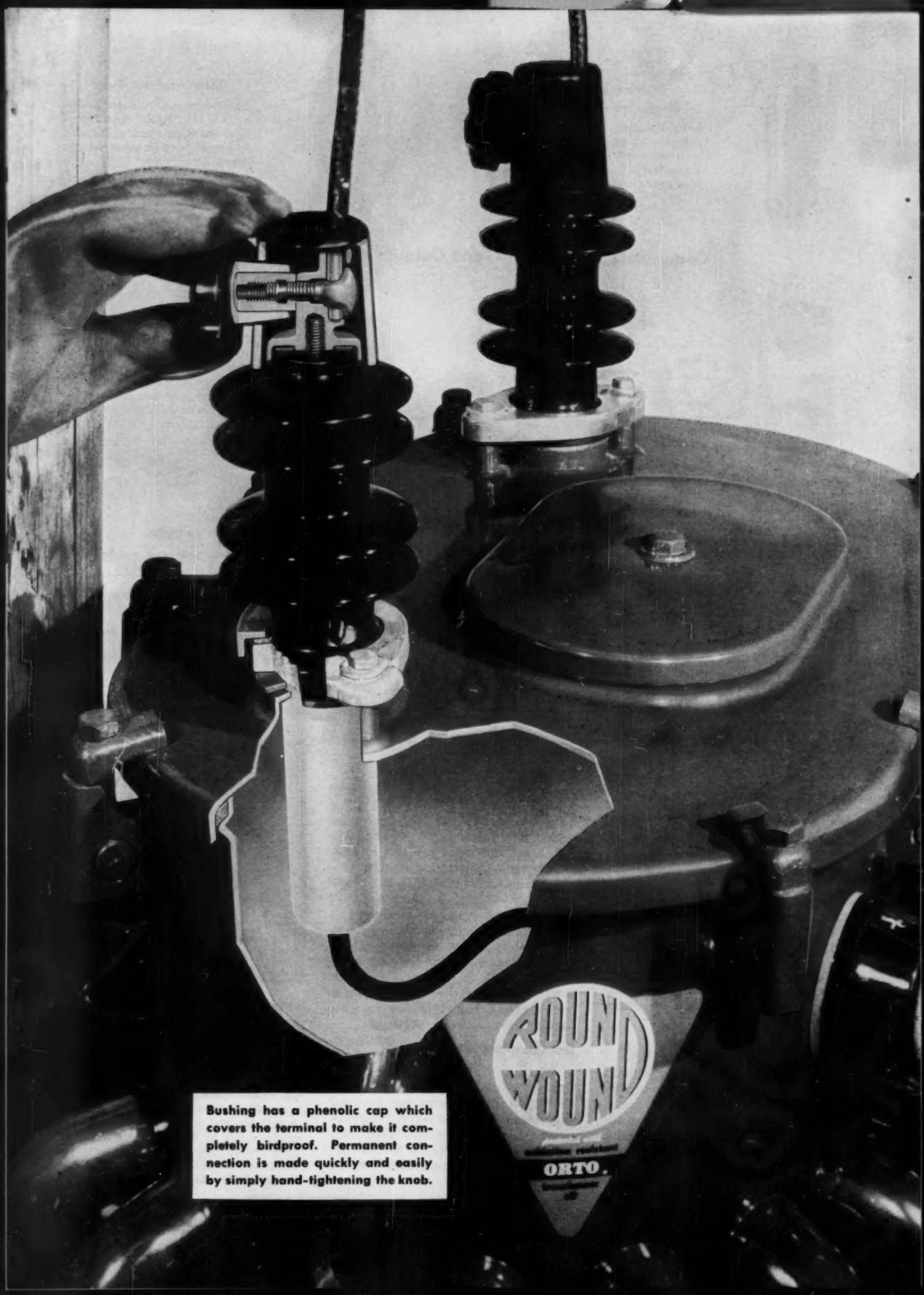
Ask the L-M Field Engineer for bulletins and complete information about L-M's full line of open and enclosed fuse cutouts and other protective equipment. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



How Double Venting Controls Pressure

On low-amperage faults, ample pressure is provided to insure fast arc extinction, by single venting at the bottom of tube, *A*.

On high-amperage faults, heavy-duty cap at top (*B*) opens so that pressure is vented at both top and bottom of tube, providing greater safety by eliminating tube rupture. Note that the gases from the top are vented vertically—not horizontally. This eliminates danger of contact flashover.



Bushing has a phenolic cap which covers the terminal to make it completely birdproof. Permanent connection is made quickly and easily by simply hand-tightening the knob.

Here's Why

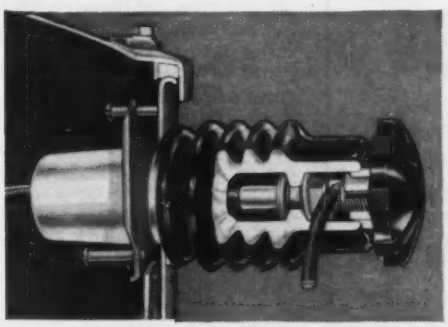
L-M Bushings Reduce Outages– Assure Safe, Easy Installation

By **R. W. HARTSOOK**
Chief Engineer
Small Distribution Transformers
Line Material Industries

Both the cover-mounted and sidewall-mounted high-voltage bushings on L-M transformers are fully insulated to eliminate outages caused by birds and animals contacting the terminal. The bushings also have a hand-tightening knob so terminal connection can be made securely, with ease and safety.

Standard Arrester Mounting

The cover bushing has a phenolic cap which covers all exposed live parts of the bushing. The cap has a drain to prevent water accumulation. When lightning arresters are installed as part of the transformer unit, they can be mounted in the regular manner and gapped through a slot provided in the insulating cap.



Cutaway view of bushing shows the heavy connector that grips the conductor. Handle cannot come off accidentally, but it can be removed intentionally.

Good Clamping Pressure

The connector knob on the bushing is large, giving plenty of leverage. A firm connection is made quickly and easily without tools or removal of any parts. Even with a gloved hand the lineman can get a good grip, so hand-tightening is all that is necessary for a permanent connection.

Bushing connectors comply with all EEI-NEMA specifications, including vertical take-off.

Sealed Against Moisture

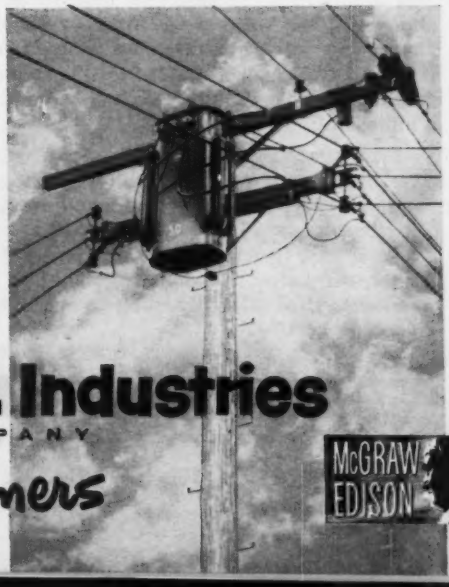
The cover bushings on L-M transformers are externally clamped to a cover boss which is raised well above the surface of the cover. Between the boss and the wide skirting of the bushing is a corprene gasket which assures excellent sealing. Surface moisture cannot flow into the bushing entrance.

A simple two-piece external clamp holds the cover bushing firmly in place. No nuts or clamping parts are used internally. The porcelain can be removed or replaced quickly and easily without removing the tank cover.

Sidewall bushing design is also leak-proof and inherently siphon-proof—moisture can't be drawn in; oil can't seep out. Sturdy internal clamping reduces the length of porcelain on the outside of the tank and thus reduces the required pole space.

Get Complete Information On L-M's Round-Wound® Transformers

L-M's bushing design is only one of many plus features found on L-M Round-Wound transformers. The most important thing about these transformers is their outstanding performance. Ask your L-M Field Engineer for complete information and bulletins. Or write Line Material Industries, Transformer Division, Zanesville, Ohio.



LINE MATERIAL Industries
McGRAW-EDISON COMPANY
Transformers

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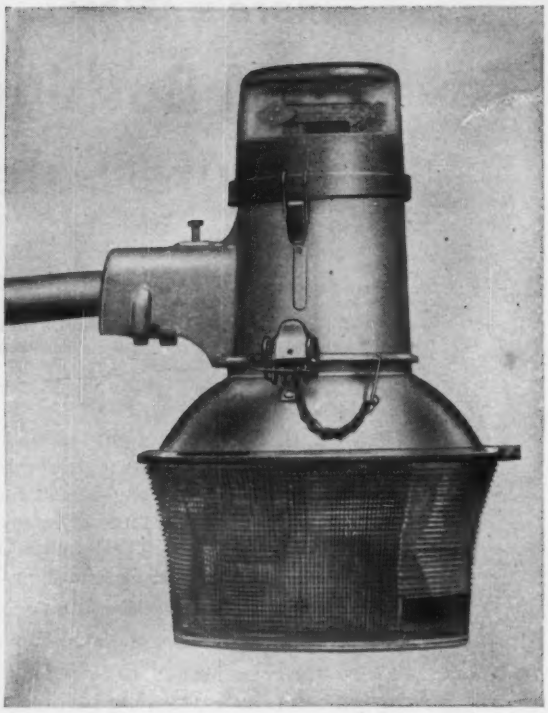
McGRAW EDISON

L-M Suburbanaire Gives Protection, Adds Off-Peak Load

Utilities rent customers this photocell-controlled luminaire at about $3 a month; it provides all-night lighting for security and recreation; increases revenue for the utility. Open-type refractor keeps maintenance at minimum.



A number of utility companies have had excellent results with a new plan for individual outdoor lighting for customers. Here, briefly, is the plan:

- The utility installs the L-M Suburbanaire on the customer's premises without charge. The Suburbanaire is an open-type, low-cost luminaire with built-in photocell control, thus providing all-night yard lighting.
- The utility maintains the unit and keeps it in operation.
- The utility provides power which does not go through the customer's meter.
- Cost to the customer is a stated amount per month—usually $3 or $3.50—which covers all costs. The utility retains ownership of the luminaire.

Customers like the plan, because it safeguards property, cuts vandalism and theft, reduces accidents, and has some prestige value, particularly in areas where there is no street lighting.

From the utility standpoint, the plan increases revenue in off-peak hours. Here is what some utility men say:

"We have installed more than 200 L-M rural lights, increased our off-peak load by more than 50 kw, and have had many expressions of complete satisfaction from our customers."

"The Photocell Suburbanaire assures us of an off-peak load of about 1000 kw hours per unit. We have installed almost 400 Suburbanaire luminaires, many of these replacing the old makeshift radial fixture arrangement. Customer reaction has been excellent . . . equipment and gasoline theft has dropped substantially and vandalism is almost nil."

"From time to time, customers have asked us for outdoor lighting for rural and suburban homes. Since January, 1957, we have been installing L-M's new Suburbanaire unit. The long-life lamp and photo-electric cell, plus ease in relamping and cleaning the open refractor, will keep our maintenance costs at a very low minimum. This makes it possible to offer this service at a very low cost."

TYPICAL ANALYSIS OF COSTS

Material:	
Suburbanaire, photocell, bracket, etc.	$ 70.00
Installation labor	30.00
Annual power cost (based on 300 watt lamp burning 4000 hrs. per year @ 1¢ kwh)	12.00
Lamp replacement, maintenance	9.00
Total Cost First Year	**$ 121.00**
Outdoor lighting equipment is built to last 20 to 25 years, but if this equipment is amortized over 10 years, the cost will be:	
First-year cost (above)	$121.00
Nine times power and maintenance cost (9 more years) 9 x ($12 + $9)	189.00
10-year total	$310.00
Interest at 6%	18.60
Profit, at 10% on $328.60	32.86
Total 10-Year Cost Plus Profit	**$ 361.46**
Annual cost (1/10th)	$ 36.15
Cost per month (1/12th)	$ 3.01

Get The Whole Story

Ask the L-M Field Engineer for bulletin on the L-M Suburbanaire luminaire and more information on the profitable customer-rental plan. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

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LINE MATERIAL Industries Outdoor Lighting

McGRAW-EDISON COMPANY

Editorial Comment

FEBRUARY 17, 1958

Southwestern G&E Merits Support in Advertising Tax Case

Southwestern Gas & Electric Co is performing a notable service for all electric companies by challenging the Internal Revenue Bureau ruling on advertising expense. The Bureau disallowed as business expense a total of $23,309 which the company had spent for advertising.

In its suit to recover excess tax charges, Southwestern contends that the proposed federal power expansion in its area is "a threat to the plaintiff's business and property." The advertising, the company says, "was for the purpose of informing the public and for the information of the company's customers . . . (and) a necessary step in the protection of its business."

Southwestern G&E, formerly under the presidency of Frank M. Wilkes and now under J. Robert Welsh, has been one of the leaders in fighting expansion of federal power projects in the Southwest. Taxpayers the country over are indebted to Wilkes and Welsh for helping to publicize the red-ink operations of the Southwestern Power Administration and encouraging that agency to set rates which would more nearly repay tax money put into power projects.

Industry as a whole cannot afford to sit back and let Southwestern carry on this fight alone. Since electric company advertising is among the first to come under fire, it looks as if our industry will have to take the lead in challenging this new phase of federal encroachment.

Shock Victims Shouldn't Bear All the Blame

Fatal accidents in the electric light and power industry are, according to the latest Edison Electric Institute report, at the lowest point in more than a decade. That this is true at a time of record breaking expansion is vastly to the credit of those charged with the responsibility of promoting safety in our industry.

But the fact remains that 72.1% of the 97 fatal accidents reported in 1956 were of one type—electric shock and burn. In spite of our best efforts over the last 16 years, electric shock and burn accidents, have always been responsible for more than 60% of annual fatalities. One year they accounted for over 77%.

The surprising fact is that a high percentage of shock and burn accidents happen to men who have been tutored in safety for years. The EEI report shows that in 1956 over 55% of the victims of shock and burn accidents were between 25 and 35 years old, and that over 47% of them had been doing this kind of work for more than five years; 20 of them for over 10 years.

All too frequently the victims had failed to use rubber gloves, or to test for voltage or ground before starting work, and accidents had followed. But the whole blame for the sustained high percentage of shock and burn fatalities cannot be placed on the accident victims. The industry and its management must accept responsibility for three contributing factors:

1. Failure to make sure that safety rules, safe work procedures, and methods are understood by all.
2. Failure to insure that all understand why the rules are important.
3. Failure to emphasize the importance of following these rules.

When these acts of omission are remedied, shock and burn accidents will represent a smaller percentage of the total.

EDISON MEDAL is presented to J. K. Hodnette by J. H. Foote, Commonwealth Associates, AIEE vice president; left is Walter Sammis, Ohio Edison Co, former EEI president; right, Elgin B. Robertson, former AIEE president

AIEE Winter Meeting Told

New York conclave hears IBM's Watson on nation's need; nominates Hickernell; awards Edison Medal to Hodnette

This nation can regain its scientific prestige only through the outright federal subsidy of teachers' salaries at all school levels, Thomas J. Watson Jr, president of International Business Machines Corp, told the 1958 general winter meeting of the American Institute of Electrical Engineers in New York.

Watson's address, launching the AIEE's 46th such meeting, was read at the general session by his brother Arthur R. Watson, president of the World Trade Corp. Both the principal speaker and Walter J. Barrett, president of AIEE, did not attend in person due to illness.

Barrett's Successor Nominated

The general session also heard announcement of the nomination of L. F. Hickernell, vice-president, Anaconda Wire & Cable Co, as Barrett's successor. At this session, John K. Hodnette, executive vice president, Westinghouse Electric Corp, was presented with the AIEE's highest award, the Edison Medal.

"We can't afford to lose the respect of the world," Watson told the delegates. "And for my money, the best way to regain prestige is through a fundamental change in our whole approach to the educational problem. The present situation is dangerous, and I believe that the application of the incentive system to the teaching profession is the strongest step we can take.

"I believe that all the fundamental frontiers of the world begin today in the educational area. Here one finds the real battleground for the winning or losing of the long-term contest with the Soviet Union. The fundamental job is to recruit outstanding people for the teaching profession and upgrade the people in the program, with equal emphasis on the elimination of the incompetents.

"That the engineer makes things happen is evident in our everyday lives. In the past 20 years you have been modifying our civilization at an ever accelerating pace. Today we live in a marvelous era where the pushing of buttons by the housewife, the mechanic, the factory worker, the airline pilot, and even the business man accomplishes a very significant part of the work of the world. Knowing that you are one of the influential groups who make things happen, I want to lay this major problem and possible solution before you today."

Engineer Shortage to Continue

In accepting the Edison Medal, Hodnette declared that the evidence of a continuing shortage of engineers is overwhelming.

"Until the bulk of the postwar generations has graduated from the engineering schools," said the Westinghouse executive, "the shortage of really creative engineers will be with us always.

"In fact, our labor force in the next 20 years will increase at a rate far below that of a soaring population and of the demand for addi-

INDUSTRY DIVISION first prize goes to Kan Chen, Westinghouse Electric Corp. Center is N. Cohn, Leeds & Northrup, who took second prize for his paper in the power division. Presentation is by J. H. Foote, AIEE vice president

Schoolmen Need U.S. Subsidy

tional goods and services. To maintain our rate of national growth, we are going to have to increase our productivity per worker by almost two-thirds—and the problem will be much harder if the work-week is reduced.

"That means better machines, and more and better technicians, engineers, and scientists to design, build, maintain, and run them. As our technology improves and becomes more complete, the need for trained people inevitably rises."

'Glamor, Stability' Themes Urged

Hodnette, predicting a "glamorous" and "stable" future for the electrical industry, urged that such a picture be presented to attract young men to the industry. Such a picture, he said should be "sold" often and eloquently by "individuals, industry, and professional societies."

"The electrical industry," Hodnette declared, "lies at the heart of three of the four great technological developments of our age—nuclear power, electronic computers, and automatic controls. It will be intimately associated with the fourth development, travel through space."

Hodnette received the 1958 Edison Medal for "his significant contributions to the electrical industry through creative design and development of transformer apparatus which marked new advances in protection, performance, and service. For his vision, judgment, and management skills which fostered and achieved the practical application of his ideas with resulting advancements in the electrical industry."

Highlights of Hodnette's career were reviewed by Walter H. Sammis, Ohio Edison Co. One of the medalist's outstanding achievements was the development of a power distribution transformer completely self-protected against lightning and electrical overloads. In 1939, he was awarded the Westinghouse Order of Merit, highest honor bestowed by his company.

D. M. Quick, Public Service Electric & Gas Co, was chairman of the general winter meeting, and in the absence of AIEE President Barrett the Edison Medal presentation was made by J. H. Foote, vice president.

Other Officers Nominated

The nomination of these vice presidents was also announced: Lynn C. Holmes, Stromberg-Carlson Co, District 1; Joseph R. Kerner, Westinghouse Electric Corp, District 3; Robert B. Gear, Commonwealth Edison Co, District 5; Ingwald T. Monseth, Westinghouse Electric Corp, District 7; John M. Nelson, Westinghouse Electric Corp, District 9; and Warren H. Chase, Ohio Bell Telephone Co, District 11.

New directors named include: William A. Lewis, Illinois Institute of Technology; Norman F. Rode, Agricultural & Mechanical College of Texas; and, Eugene C. Starr, Oregon State College. Clarence H. Linder, General Electric Co, was nominated for treasurer.

Here's what L. F. Hickernell says about AIEE ➡

AIEE presidential nominee L. F. Hickernell sets aim on . . .

Meeting Challenges in Specialists' Age

American Institute of Electrical Engineers' technical organization today is a "blend of two different philosophies," which evolved to meet snowballing membership needs in an age of specialists. The opportunity to disseminate information on the complete range of electrical engineering subjects is a challenge to the administration of the Institute.

That is how the situation was expressed by L. F. Hickernell of Anaconda Wire & Cable Co, and AIEE's 1958 presidential nominee.

"Hick," as his friends call him, points out that the Institute's technical programs are purposely broad, with as many as 12 parallel sessions at the Winter General Meeting.

"It's the only way," he said, "to bring all electrical engineers together and achieve cross-fertilization among the specialists.

"On the one hand," Hick continued, "we're operating a conventional engineering society organized in vertical groupings, such as transformers, switchgear, computing devices; while on the other hand we are running a flock of industry organizations, which cut horizontally across several groups."

Engineering today gets into all phases of industrial and economic life, from research to merchandising. Needing to serve the varied interests of its members and to interpret their efforts to the public, the technical society is undergoing evolutionary changes.

"From one side, it looks like a learned society; from the other, like an industrial trade association," was the way Hick put it.

AIEE Could Broaden Work

AIEE, too, could broaden and intensify its activities.

"If we had all 50 of our technical committees operating with specialized subcommittees, and local groups to bring into active participatation more young engineers, it would help enormously to satisfy the technical needs of our members and, at the same time, retain the unity and contact essential to professionalism and cross-fertilization," he said.

The first big AIEE job fell to Hick 28 years ago when he was named chairman of the Detroit-Ann Arbor section. Later he served eight years on the national Planning and Coordination Committee, three years as its chairman. He has sat on the board of examiners for 17 years, five of them as vice-chairman. He has spent five years on the Technical Operations Committee, two of them as chairman. In addition to his present position as treasurer of the Institute, he is an AIEE representative on the board of directors of the Engineers Joint Council.

Hick, who became the first chairman of AIEE's Insulated Conductor Committee in 1947, has an infinite capacity for AIEE work and its problems.

Helped Reorganize AIEE

With respect to AIEE's problems, Hick gives serious and recurrent thought to its management. In the first place, he was the guiding hand in the reorganization of AIEE, as chairman of the Planning and Coordination Committee. Most of his ideas were incorporated in the new organizational setup. But he still feels that department managers, with their operating experience and knowledge of current problems, should be seated on the board of directors.

Switch in AEC Policy May Be Next

Agency is ready to agree on premise of U. S. leadership need, sources say. Stepped-up federal program would follow

The electric power industry may find out this week whether, and how far, the Atomic Energy Commission is willing to give in to demands from Congressional critics that the federal government step up its subsidy of civilian power reactors.

AEC officials this Wednesday go before the Joint Committee on Atomic Energy to make their annual report. The big issue to be debated is whether the government should build or subsidize construction of large-scale nuclear reactors.

Committee Chairman Carl Durham (D-N.C.) is clearly thinking in terms of a five or ten-year program. At the least, he would like a policy declaration that the U. S. will push vigorously ahead with development of nuclear technology for international reasons, even if there is no immediate domestic need.

To back up his position, Durham has released a staff summary reflecting the views of equipment manufacturers who met with the committee a month ago. The equipment men are described as reaching "virtually unanimous agreement" that without a statement of government policy in the nuclear power field, "participants in the program cannot move forward confidently and the program has a tendency to drift rather than move vigorously ahead."

Strauss has little patience with charges by critics that the civilian reactor program is bogging down. But Congressional sources report that the negotiations have borne fruit, and a switch in AEC policy may be forthcoming.

Economic A-Power in Ten Years

AEC is described as ready to agree to the fundamental policy premise that the U.S. should try to achieve economic atomic power in this country within ten years and abroad within five. This would be based on recognition that the U.S. must fortify its position of world leadership in peaceful application of atomic energy.

If AEC makes this policy statement, it is widely expected that legislation embodying some form of accelerated federal help to the atomic industry will be difficult, if not impossible, to stop.

Joint committee sources warn that negotiations are still in progress, and that no agreement with AEC has been finalized.

Strauss' critics, mostly Democrats, argue that more large-scale plants must be built than are now in the offing if competitive nuclear power is to be achieved. And they insist that private enterprise simply isn't able or willing to take the tremendous losses that are expected to be involved in construction of the big reactors during the next few years.

The answer, say these Democrats, plainly lies in government construction of large-scale atomic power reactors.

Sen Albert Gore (D-Tenn.) has proposed a $400-million government reactor construction program to start. Past Congressional efforts to put over a federal reactor construction program have failed in the face of opposition from the electric utility industry, coal producers, and AEC itself .

However, a new factor increases the likelihood that Congress this year will order some kind of step up in AEC's support of the civilian reactor program. That is, the gradual swing of the reactor equipment firms from a no-subsidy policy to the decision that more government help is needed.

However, it is important to note that the industry leans strongly toward government help on building privately-owned reactors, rather than outright construction of federal power reactors as proposed by Gore.

Private power sources in Washington reiterate that the industry opposes federal subsidy of private reactors just as it opposes federal construction. But they concede privately that there is serious danger that the committee will vote out legislation of one kind or the other.

Nuclear Notes

Elk River proposals have been received by AEC from A.C.F. Industries and General Electric. The offers are to design, develop, construct and test operate a boiling water reactor and conventional fuel-fired superheater for Rural Cooperative Power Assn. Plant would generate 22 Mw net. Proposals place a limit on cost to AEC.

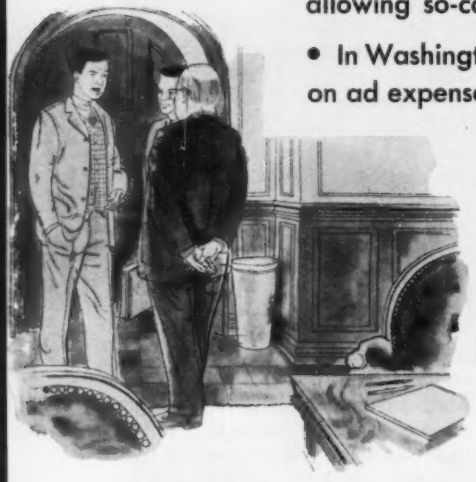
Opinion poll on U. S. atomic power policy shows 69% of domestic organizations of Atomic Industrial Forum believe U. S. development activity should be expanded. And 62% believe expansion should be formalized in new national program. Three steps on program evolved from sampling: **1.** Government-sponsored R&D activity in non-government facilities. **2.** Modified government procurement policies and practices to increase economic incentives. **3.** Government-sponsored R&D in national labs.

Vallecitos BWR output is up 50% from a maximum of 20 to 30 Mw of heat. New heat output supplies steam to generate about 6.5 Mw electricity. "We look on this increase as only the first of several steps in approaching the actual capability of the present reactor plant," said S. Untermyer II, operating manager of the GE facility.

The Washington Wire

Ad Expense Heads Into Tax Wringer

- **Review begins of 1954-56 returns with the aim of disallowing so-called 'propaganda' advertising expense**
- **In Washington, prospects are slim that action will be taken on ad expense bills of Rep Johnson and Sen Langer**



Electric utility companies are beginning to feel the effects of a reminder sent out recently by Internal Revenue Service to its regional offices.

The reminder explains that money spent on so-called "propaganda" and "political" advertising is not allowed as a business expense in corporate income tax returns.

Reliable sources report that review of power company tax returns for the 1954-56 period is already underway in some places.

Normally, a return is closed after three years. Those filed in 1954-55-56 could be re-evaluated by federal tax agents just on the question of allowability alone—in the event some IRS regional offices chose to re-open company tax returns. Involved is much of the Electric Company Advertising Program (ECAP), which is the piecé de resistance that federal power partisans hunger over.

Southwestern G&E Fights Back

The only defensive action to date is a suit filed by Southwestern Gas & Electric Co in Shreveport, La., (EW, Feb. 3, p 59). SG&E seeks to recover some $20,000 which was disallowed from 1947 through 1950 for 86 ads. Most of the disallowed ads dealt with the effects of government competition in the Southwest. The suit will be heard in a federal court.

Four bills have been introduced in Congress. Rep Lester Johnson (D-Wis.) has worked out a couple which would make "propaganda" advertising nondeductible for income tax purposes and require Federal Power Commission to exclude any such ad charges from utility operating costs upon which rate structures are based.

Across the capitol, Sen William Langer (R-N.D.) has whipped up two other similar bills—identical in purpose, but not in language.

All Four Bills May Fail

After making allowances for inherent dangers of second-guessing Congress, Washington observers figure none of the bills has much chance of passage. The four measures are in committee. The House Commerce Committee, which has Johnson's bill on rate-basis determination, could call for public hearings on FPC rate-fixing policies, however.

But Johnson, it seems fairly certain, will not be stirring up the committee very soon. He's apt to be defending the federal dairy price support from congressional attacks for the next few months. (Dairy subsidies, incidentally, cost U. S. taxpayers $378 million in the last fiscal year, says the Dept of Agriculture.)

Meanwhile, it appears the Internal Revenue Service may deplete the Johnson-Langer pottage of tax deductibility for "propaganda" ads. IRS has already reminded its regional offices that the code disallows deduction of such expenses.

The "propaganda" definition in Johnson's bills says it is any advertising which is not intended to sell goods or services, but rather to "influence public opinion on policies pursued by or proposed by any branch of the federal, state, or local governments; or . . . designed to influence public opinion concerning, or affecting in any manner, the degree or extent of competition resulting from the existence of federal, state, municipal or other public or cooperative enterprises or agencies."

A critical blasting of IRS came recently from the Advertising Federation of America's board chairman, Robert M. Feemster. He is opposed to a proposed IRS code revision that would broaden the disallowance of "propaganda" ad expense for tax purposes.

Who Decides 'Propaganda'?

"Who determines what is propaganda," Feemster asked. Under the wording of the proposed change, his and other groups, he said, would be hampered in the fight against cities proposing taxes on advertising.

IRS said the proposed regulation has been circulated for public comment since April, 1956. Public hearings were held in September of that year, but, according to Feemster, only "with barest legal minimum of publicity about them." He said hearings should be reopened by IRS.

The proposal adds this sentence: "No payment made, either directly or through any organization, for the specific purpose of attempting to promote or defeat legislation shall be deductible. . ."

Line Sag and Shimmy Attacked at New Lab of Thriving Ohio Firm

Preformed Line Products Co, a ten-year old company, opens research lab to find better ways of cutting damage of wind vibration

ENDURANCE TEST of preformed armor on vibration spans simulates wind-induced aeolian vibration at new center

A new assault on the physical problems of overhead transmission and distribution got underway last month in Cleveland. Preformed Line Products Co opened its Research & Engineering Center, which the Ohio-based firm believes is the most advanced of its kind.

The laboratory houses specialized equipment—most of it designed by PLP engineers—to simulate field conditions and for study of conductor stress and tension.

Equipment includes six 125-ft vibration spans on the ground floor. A cyclic current splice test rack exposes conductor to the elements on the roof.

The $500,000 building has 20 pieces of major testing equipment, chemical lab facilities, machine shop, technical library, photographic studio, and engineering offices. The one-floor layout consists of 20,000 sq ft of space.

Forty people work at the center under the supervision of Jon R. Ruhlman, vice president and director of research and engineering, and James C. Poffenberger, assistant director.

Lab: Latest Stride Forward

The lab is the latest advance of the company since its formation in 1947 when President Thomas F. Peterson introduced PLP's preformed armor rod—its first product.

Through the years, dead-ends, splices, lineguards, splice shunts, lashing rods, spacers, patch rods, and tap armor were developed. Two recent suspension innovations are an armor-grip suspension for conductor and twin-grip for supporting static wire. The firm now makes 40 types of line accessories in about 6,000 designs.

PLP now spends about $200,000 a year on applied research. Company officials attribute a sales growth from $300,000 in 1947 to over $6 million last year to this emphasis on research.

The firm's debut was in rented space. Today, PLP's facilities include two plants and the center in Cleveland and a plant in Palo Alto, Calif. Three employees were on the payroll ten years ago compared with 300 in 1958.

Peterson, a former American Steel & Wire Co engineer, is responsible for most of the patents on PLP's products. The company's other executives include Albert Bonds, operations vice president and treasurer and Philip M. Schloss, general sales manager. Schloss heads two district offices and 34 representatives. A foreign licensing operation recently extended PLP's sales operations over the world.

OPEN HOUSE participants include, from left, VP Ruhlman and Pres Peterson of PLP; Joseph Zell, Dayton P&L; Philip M. Schloss, PLP sales manager; and Paul R. Critzer, Cleveland Electric Illuminating Co

The News-Beat

Merger Pending

Directors of both Washington Water Power Co and Spokane Natural Gas Co have announced an agreement providing for a merger. The agreement involves a transaction of about $15 million, subject to approval of stockholders of both firms. Approval also is needed from Washington and Idaho regulatory commissions.

WWP would assume assets and liabilities of Spokane Gas and trade .2174 of a share of WWP common stock for each share of the gas utility's stock under the proposal.

Navy Drops Sodium Reactors

Sodium-cooled reactors for the Navy's nuclear powered fleet have been ruled out. The Navy tried one in the Seawolf, its second atom submarine, but higher radio-active hazard and hard-to-stop leakage ruled the type out. Congress has been asked for $20 million to pull the sodium reactor and install a pressurized water system similar to the Nautilus'.

CP&L Defends Rates

Thirty-eight of Carolina P&L's industrial customers have petitioned the State Utilities Commission for relief from "excessive, unreasonable, and unjust rates." CP&L Pres Louis V. Sutton says 34 are textiles who want rates comparable to those of Duke Power. But Duke, he said, serves the largest concentrated textile load in the world, pays lower freight rates on coal, and enjoys other advantages. He cited several industrials which he said are satisfied with power rates in CP&L's service area.

Miscellany

- When Bonneville Power Administration restored available interruptible power to its normal 480-Mw amount, it got "no takers" for additional load above the 190-Mw restored earlier to 14 industrials. Reason: Slack market and high inventory has precipitated a temporary Alcoa slowdown.
- Sixteen municipal and co-op distributors of TVA power have cut consumer rates 10 to 20% below initial levels during fiscal 1957, TVA reports. This brings to 63 those who have adopted rates below the "basic level" since associating with TVA; but none are major distributors, says "Knoxville News-Sentinel."
- Negotiations between rural electric co-ops and private companies in Arkansas for a 100-Mw steam plant have broken down. A spokesman said the co-ops would try to build the plant alone.

John Day's Site Set

Site of the John Day Dam on the Columbia River has been confirmed at river mile 215.6, about 4 mi. below the mouth of John Day River. Under present Corps of Engineers proposals, the $350 million dam will be 105 ft high, staffed by twelve 108.7-Mw units.

Which of These Four Will Win Coffin Award?

Four electric utility companies have received citations for the Coffin Award by the review committee. The citation was accompanied by invitations to submit presentations for the annual award.

Twenty-one nominators originally nominated 28 candidates for the honor, which is presented annually by General Electric Co to the industry's top power company.

Nominees and the committee's reasons for their selection:

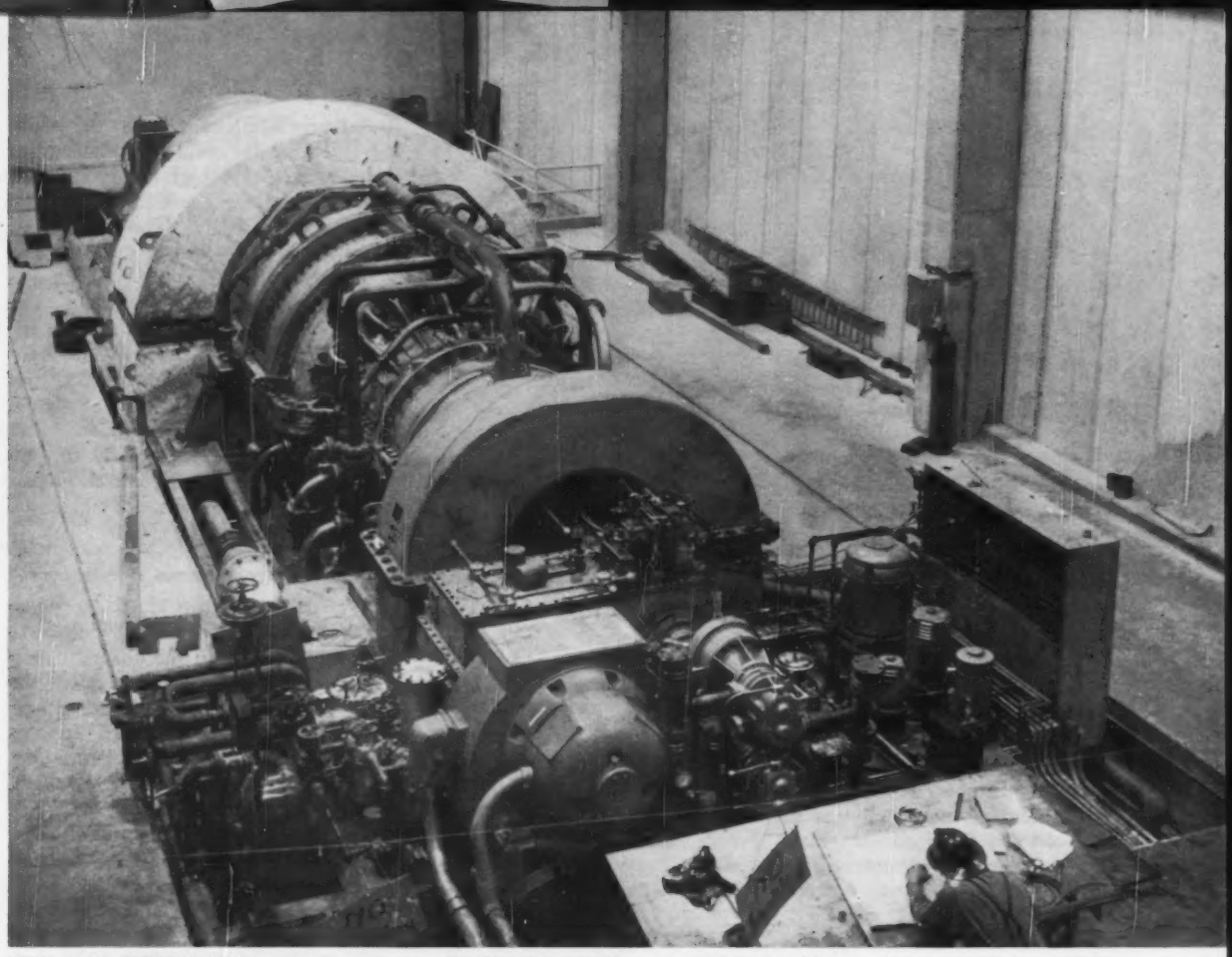
Commonwealth Edison Co—For achievements exemplified by company-wide decentralization of operating activities, which resulted in improved efficiency and closer contact with the public; use of electric computers for customer billing and engineering problems; studies of economical use of power equipment through higher thermal operation and life testing of underground plant; developments in low-cost residential underground systems; and atomic power accomplishment.

Consolidated Edison Co of New York, Inc—for creative innovations and achievements including:

- Development and application of new materials and methods for underground cable systems.
- Pioneering work in public relations and commercial advertising through use of color TV.
- A rewiring program that has produced outstanding results in more adequate service entrance equipment.

Duquesne Light Co—For pioneering work, initiative and courage in planning design, and construction of the first large U. S. power generating plant using nuclear fuel. And for farsightedness in providing this demonstration of feasibility of nuclear power in the Shippingport plant for the utility industry.

Idaho Power Co—For courageous and successful campaign to build large-scale power resources on the Snake River. Against tremendous opposition, this company has battled to procure a tax-paying power supply for the benefit of its service area and has demonstrated major power facilities can be provided by investor-owned companies at no expense to taxpayers.



FIRST GAS TURBINE UNIT gets its pre-operational tests. From front, the machine consists of starting motor, air intake, compressor, turbine, exhaust, generator. Unit's exciter is hidden behind the generator (on far end)

Canadians Roll Gas-Turbine Plant

Economic studies proved its feasibility for firming and peaking British Columbia's hydro system. Plant to be workhorse for two years, then operate at 25% load factor

GENERATION—Design

JOHN G. HARVEY, Thermal Power Engineer, Sandwell & Co, Ltd, Vancouver, B.C.

The first two gas turbines of British Columbia Power Commission's Georgia Generating Station have gone on the line, each adding 19,750 kw to the Commission system. When the other two units are completed this year, the 76-Mw gas-turbine station will be the world's largest—and the first big one to burn treated Bunker C Fuel oil.

Choice of gas turbines evolved from a study begun in January, 1956. The Commission's Vancouver Island power load was increasing 30% a year, and hydro construction was unable to keep pace. Furthermore, future filling of the reservoir of the 42,000-hp Upper Campbell Lake hydro development will necessitate curtailment of the 238,000-hp John Hart and Ladore Falls plants downstream. This in turn means more generating capacity will be needed in the interim.

Canadian hydro plants, critically dependent upon runoff, cannot be relied upon to carry peak loads at all times. Thus a thermal plant for firming was becoming necessary.

Load studies showed 20 to 40 Mw of thermal peaking capacity would be needed by late summer 1957, and about 80 Mw by late 1957. Further expansion might be required later. But load factor for the new plant, forecast on a long-term basis, was set at 25%.

Three Plant Types Considered

Steam, diesel, and gas-turbine plants were considered. But economically suitable steam turbines could not be delivered to meet the required schedule. Also a steam plant's lower heat rates proved comparatively unimportant when costs

THIS IS THE SITE of Canada's big, new gas-turbine plant for Vancouver Island. Air intakes, in building shadow, face seaward to minimize sound-carry to land

were evaluated at a 25% plant load factor. Choice thus was reduced to diesel, or simple or regenerative-cycles gas turbines.

For peaking purposes, gas turbines offered these advantages:

- Lower capital investment per kw.
- Faster start-up.
- Lower labor and standby costs.
- Less cooling water needed.
- Increased winter capacity, when load requirements are highest.

A simple-cycle gas turbine plant (with waste-heat boiler and steam turbine) was found economically attractive; but its design, construction, and operation were complex. So this was passed by temporarily.

Studies evolved these comparisons:

	Capital cost $ per net kw	Heat rate Btu/kwhr
Diesel plant.....	181	9,500
Simple-cycle gas turbine plant....	132	16,100
Regenerative cycle gas turbine plant....	164	12,400

(Capital costs are comparative, and omit certain common items. Fuel costs were based on Bunker C delivered to plant by tanker.)

Operating labor costs were estimated higher for the diesel than for either the simple or regenerative-cycle gas turbine plant. Although maintenance cost data were limited for gas turbines burning residual fuel, experience on existing plants indicated maintenance would cost about $5 per kw per year.

From the foregoing, total annual operating costs—including interest and depreciation—were estimated for load factors of 10% to 100%. At 50%, diesel plants appeared best. At 35-50%, diesel and regenerative-cycle gas turbines appeared competitive. Below 35%, the simple-cycle gas turbine seemed to have lowest overall cost.

Predict 25% Load Factor

It was thought that the plant might run at full load for the first two operating years (while the Campbell reservoir is being filled). But afterward, load factor might drop to 25% or less.

Thus either a simple or regenerative-cycle gas turbine plant appeared to be more economical than a diesel plant. In addition, a combination of simple and regenerative-cycle machines offered flexibility: The more efficient regenerative units could carry most of the load, the simple-cycle units providing stand-by and peaking capacity.

Simple-cycle unit delivery could be promised by General Electric Co in time to meet estimated 1957 load requirements.

So it was decided that the plant should consist of two 20-Mw simple-cycle and two 18-Mw regenerative-cycle gas turbines which the manufacturer could deliver in time for the second stage of plant expansion.

It also was decided to design the plant to accommodate a waste-heat steam system that might be installed in the future to improve simple-cycle unit efficiency, and add 12 Mw of generating capacity to the plant.

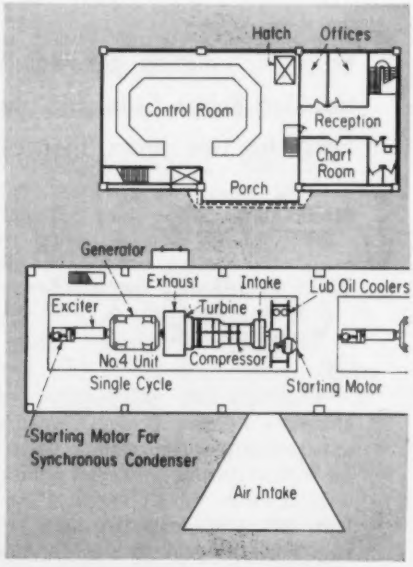
Today the nearly finished plant is located on a rock peninsula, Bare Point, off the town of Chemainus, Vancouver Island. The powerhouse is at the south end of the site. The 3½-acre, 232,000-bbl tank farm is atop a ridge at the north end. The switchyard is above and west of the powerhouse.

The first two gas turbines are of simple-cycle, single-shaft design—each 19,750 kw at 50F ambient. They are coupled directly to generators rated 25,600 kva at 30 psig H_2, 0.85 pf, 13.8 kv, 3-phase, 60 cps, 3,600 rpm.

Run as Synchronous Condensers

The second two are to be regenerative-cycle single-shaft units—18 Mw each at 50F, and linked to similar generators by flexible, quick-disconnect couplings. All four generators will uncouple and run as synchronous condensers when desired.

Air enters a 15-stage axial-flow compressor through the inlet casing at about 260 lb per sec. It is compressed to 90 psia and discharged directly into 16 cylindrical combustors, arranged symmetrically in the casing. Fuel is injected into each combustor and ignited. The burning fuel raises air from 500F to 1,450F and, in burning, consumes about



PLACING MACHINES IN A LINE, instead of putting them side-by-side, enabled

20% of the air's oxygen. The hot, mixture of gases then feeds to the first-stage nozzle of a two-stage impulse turbine. The gases expand through the turbine to atmospheric pressure and 850F before exhausting. Thermal efficiency, based on higher heating value of fuel, is 22.1%. Two-thirds of the turbine output is used to drive the compressor.

Efficiency Raised to 28.6%

In the regenerative-cycle unit, efficiency is raised to 28.6% by using a part of the exhaust-gas heat to preheat combustion air. Major components are similar to the simple-cycle units, except the combustors. Here the compressed air goes from the compressor to a regenerator—a large mass of channel sections arranged for counterflow of exhaust gas on one side and air on the other. Air is raised to about 770F in the regenerator and piped to the combustion chambers—in this case external to the machine. From combustion chambers onward, the cycle is similar to the simple-cycle units, except turbine exhaust is passed through the regenerator and leaves the stack at 530F.

The regenerator increases the compressor's load and turbine's back-pressure, and reduces output about 9%.

Each unit has a 550-hp starting motor for accelerating the turbine to self-sustaining speed—about 25% of synchronous. A separate motor starts the generator when it is used as a synchronous condenser.

During startup, a 75-hp motor-driven auxiliary pump circulates lube oil through the machine. A shaft-driven pump takes over during operation. A small dc motor-driven pump will circulate the oil after turbine trip in the event of an ac power failure.

A motor-driven compressor supplies atomizing air for fuel injection during startup, and a unit-driven compressor supplies it during operation.

53-Day Fuel Supply

The tank farm's capacity can carry the plant at full load for 53 days. It consists of three 55,000-bbl. raw-oil tanks, two 25,000-bbl treated oil tanks, and two 8,500-bbl diesel tanks. Oil flows by gravity from treated-oil tanks through a day tank to the turbine fuel pumps. Heaters installed in raw and treated-oil storage tanks hold up temperatures in the interest of plant efficiency.

Turbine operation on untreated residual fuel with a nozzle gas inlet temperature above 1,200F would result in serious corrosion of nozzles and blades. Some manufacturers limit operating temperature to 1,200F, but this also limits thermal efficiency. The turbine manufacturer devised ways of burning residual fuel at a 1,450F inlet temperature.

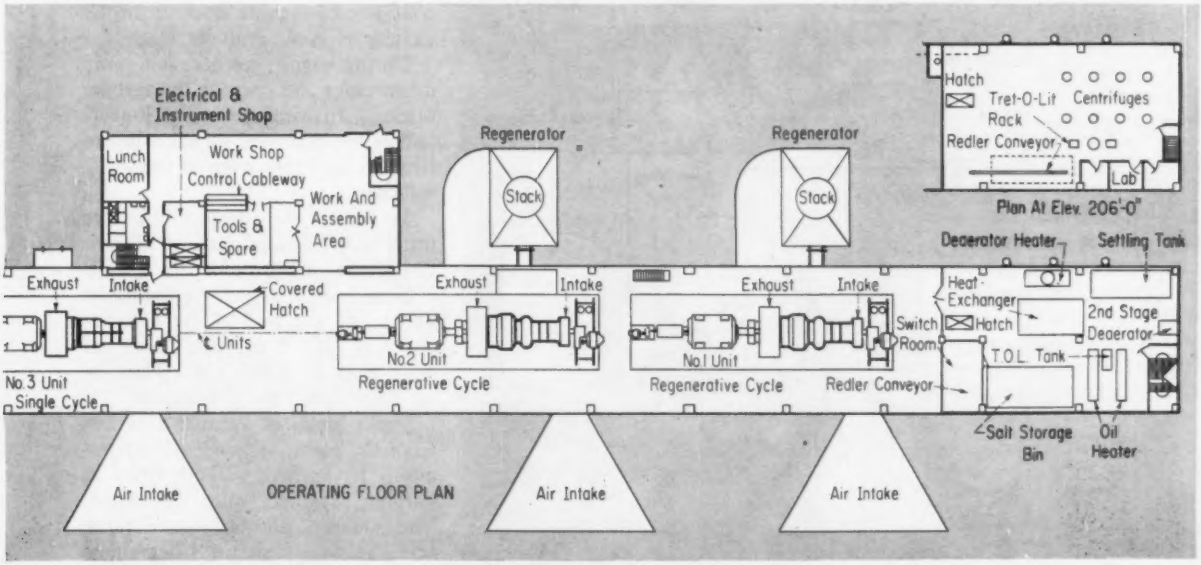
It found three harmful elements which are present in most residual fuels: Sodium, vanadium, and calcium. Sodium forms corrosive sodium sulphate in fuel ash, and deposits ashes in blade passages. Vanadium forms vanadium pentoxide corroding nozzles and buckets rapidly—especially at temperatures above 1,200F. Calcium forms hard deposits in blade passages.

It was found that adding magnesium sulphate (Epsom salts) to fuel inhibits vanadium corrosion. Sodium corrosion also could be limited but at the penalty of higher ash deposition. So a fuel-washing system was devised to remove sodium and calcium.

From tests and field experience, this treated fuel specification was evolved:

- Weight ratio of sodium to vanadium not to exceed 0.3.
- Sodium content not to exceed 10 ppm.
- Weight ratio of magnesium to vanadium in ash not less than 3.0.
- Calcium content not to exceed 10 ppm.

Untreated oil is pumped from the



engineers to create a long, thin building tailored to the sloping, narrow site. It also permitted simple, short, efficient design of intake and exhaust ducts, brief roof and crane span structures and building construction savings

raw-oil day tank, through an oil-to-oil heat exchanger, and then through a steam heat exchanger to raise its temperature to 210F. An emulsion breaker (Tretolite) is added to assist in later separation. Wash water is added. The mixture is fed to a "dispersator," a high-speed agitator which thoroughly disperses water in oil. The emulsion enters a first-stage centrifuge, where a high percentage of the water and sludge is separated and discharged to a settling tank.

Purified Further

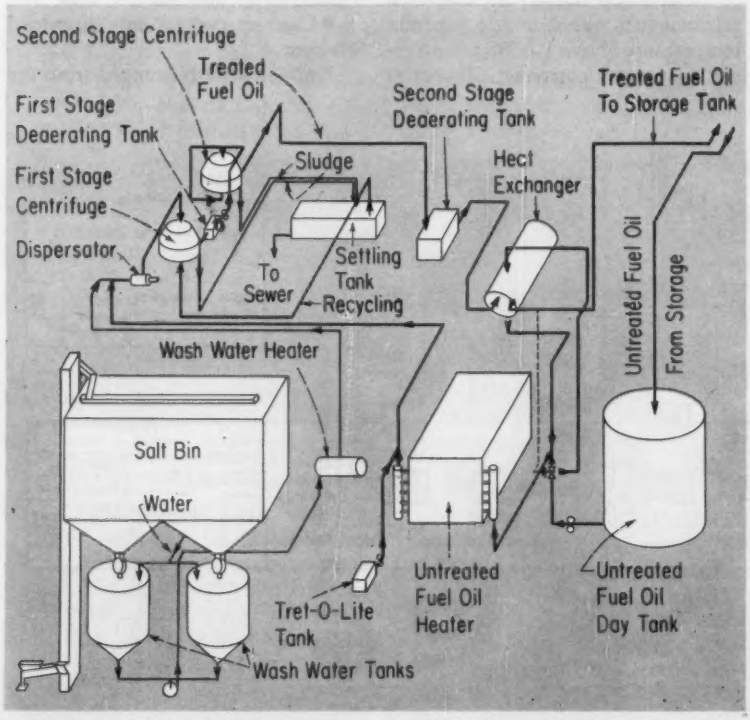
Oil is discharged through a deaerating tank to a second-stage centrifuge for further purifying. Sludge from this centrifuge discharges to the settling tank also, where some oil is reclaimed and recycled back to the first stage.

Treated oil from the second stage passes through another deaerator, through the oil-to-oil heat exchanger, which cuts its temperature from 210F to 160F, and then to treated oil storage. Temperature reduction before storage prevents a gradual oil breakdown in which asphalt settles in piping, pumps, and fuel nozzles.

Since Bunker C and water are about the same density, water for the preceding process is raised in density about 5% through the addition of a soluble salt, magnesium sulphate, to permit separation by centrifuging. The salt is trucked into the plant and added at the wash water tanks.

At this point all harmful impurities except vanadium have been removed. Oil now is pumped through another steam heat exchanger to attain atomization temperature of 230-270F, depending on its viscosity. A predetermined amount of Epsom salts solution is metered into the fuel, and the mixture is passed through a dispersator just before the turbine fuel pump, thus inhibiting vanadium corrosion of hot parts.

At full load, plant fuel consumption will run about 7,100 gal per hr, but the treatment system will handle 10,000, thus allowing for centrifuge cleaning and equipment maintenance. There will be four first-stage and four second-stage centrifuges.



THIS IS THE FUEL-FLOW SYSTEM in which Bunker C is treated to prevent damage that might be caused by its inherent sodium, calcium, and vanadium impurities

To supply the considerable fuel heating requirements, plus space heating, three 10,000 lb per hr oil-fired fire-tube boilers have been installed complete with feedpumps, deaerator, and chemical treatment system. All are housed in a fuel treatment annex.

Limited fresh water comes from a nearby municipal water system for boiler make-up, fuel-oil wash, and domestic purposes. Turbine cooling systems use salt water, except for cooling-air coolers. Here possibility of salt water leakage into nozzle-cooling air requires a salt-to-fresh-water exchanger system.

Units Shape Building Design

Design of the main building hinged upon the arrangement of machines. This, in turn, depended upon the intake-exhaust layout. Exhaust ducts required a basement depth of about 20 ft. Ducting required a design that limited pressure drop. It was desirable to put intake and exhaust on opposite building sides to lessen exhaust gas recirculation, or the intake of hot air from near the stacks. Also, it was hoped to face intakes seaward to minimize sound-carry toward Chemainus. These were achieved by installing units end to end.

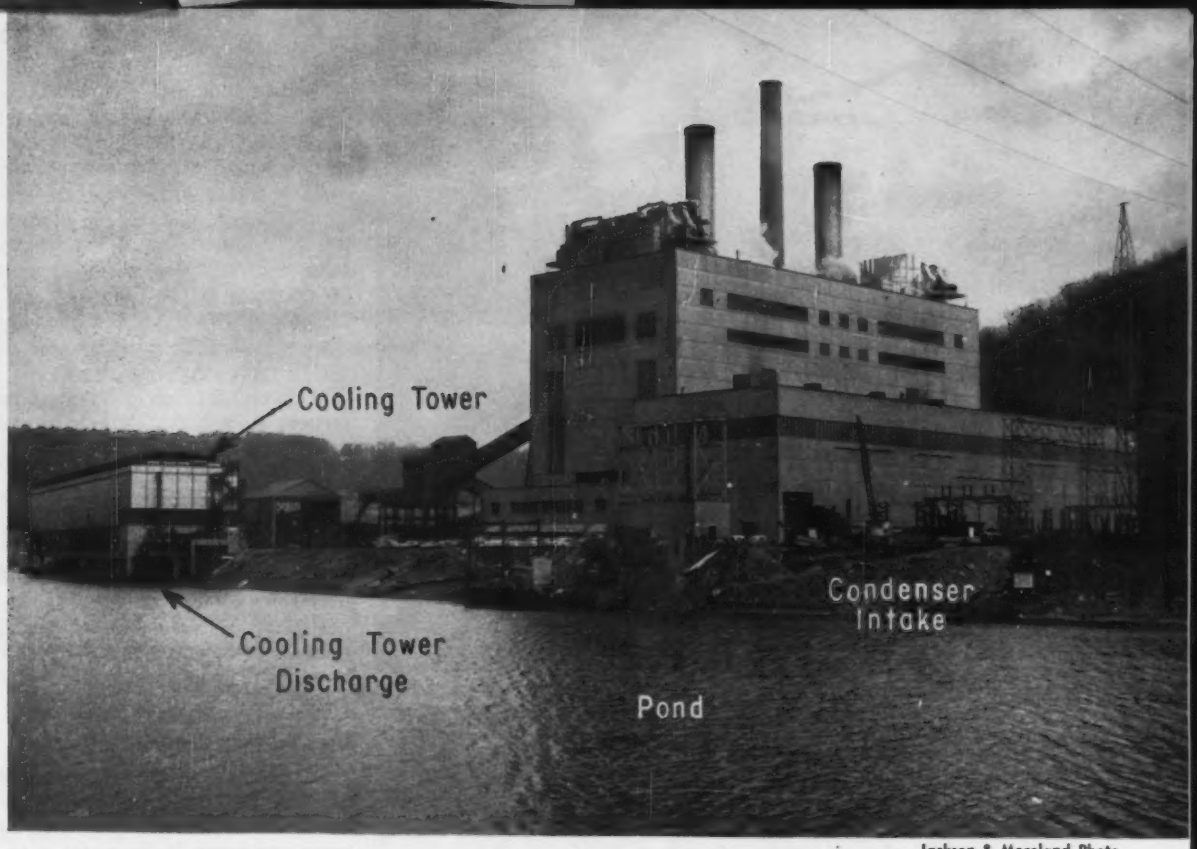
Filtration of turbine intake air reduces the rate of compressor and turbine blade erosion and limits build-up of oily deposits on compressor blades. Each intake has a double bank of stationary filters, considered adequate since air in the vicinity is comparatively clean.

During windy weather, salt spray might enter and corrode the turbine blades. So vertical cedar louver-baffles are provided on each intake front to limit this, even in the worst weather.

To reduce duct drop, elbows are fitted with turning vanes and flow restrictions are avoided.

Sound level at turbine intake is about 140 db, and at the exhaust, about 148 db. It is roughly constant from zero to 9,500 cps. Silencing on both ends thus is essential.

Noise levels at various distances from the plant, allowing for attenuations by various silencer types in varying weather, were calculated. The silencers chosen reduce noise level below 40 db at Chemainus. They appear to be performing satisfactorily.



Jackson & Moreland Photo

SHAWVILLE STATION on West Branch of Susquehanna has pond and cooling tower. Condenser intake is in foreground center. Cooling tower effluent is discharged to pond near end of tower. Condenser discharge is at tower's far end

Tower Supplements River Cooling

Well selected adjunct is economic for recirculating water when stream's flow fails to meet condenser requirements

GENERATION—Design

H. J. NICKEL, Principal Mechanical Engineer, Jackson & Moreland, Inc, Boston, Mass.

A properly sized cooling tower is often an economic adjunct to a power plant which has impounded a small river to obtain its circulating water. When the river flow drops below condenser requirements, the tower furnishes supplementary cooling. Such is the arrangement at Shawville Station of Pennsylvania Electric Co on the West Branch of the Susquehanna River.

In general, the small river supplies circulating water in all but the year's driest season. Then, as stream flow drops off, recirculation of some of the condenser discharge becomes necessary. This the tower cools effectively. The water, as it is discharged from the cooling tower, is returned to the intake, mingles with the river flow in the pond, and is taken into the condenser. What remains of the warm condenser discharge, roughly equal to the river inflow, is returned to the stream below the impounding dam.

The economic size of such a supplementary cooling tower is influenced greatly by three factors: The seasonal pattern of the power company's loads; the river and air temperatures; and, the stream's hydrology.

When annual system peak load coincides with high river temperature and extremely low flows, the tower should be relatively large. On the other hand, when annual system load peak is not at this season, a smaller tower along with acceptance of a reduced station capacity may be more economic. The frequency and duration of low river flow and high water temperature definitely affect station capacity and heat rate.

Present worth of the cooling tower's annual revenue requirements over the study period must not exceed that of the annual savings over the period. Major savings are in capacity benefits (revenue requirement of the additional investment otherwise required) plus the fuel cost differential for supplying the greater load without the tower. Revenue requirements include return on investment, depreciation, taxes, and operating and maintenance expenses.

Even when the driest season overlaps the peak system loads, the economic tower size is smaller than that which could maintain full station capacity under the most adverse river-flow and temperature conditions. Such adverse conditions might

Jackson & Moreland Photo

COOLING TOWER at Shawville has hot water sump under the pumps near left-hand corner of tower. In the photograph several of the dam's flashboards are partially lowered to pass the excess hot water into the stream below the pond

not be repeated for many years. The capacity reduction they produce should be considered a contingency against which normal system reserve capacity is maintained.

Determination of economic cooling tower size begins with the establishment of an equation for the heat balance of the cooling water system. It should include expressions for heat dissipation from the pond and from the tower in terms of condenser-leaving temperature, wet bulb, and dew point. Condenser inlet temperatures, with and without the tower in operation, are computed using this equation and the river flow, and the river-water, dew-point, and wet-bulb temperatures likely during each critical month and in all probable combinations.

The number of hours during which each computed inlet temperature may be expected to exist during the month is calculated, assuming random occurrence of each variable and frequency of occurrence of each variable's values as indicated by past records.

Condenser inlet temperatures and hours of occurrence, with and without the cooling tower, are then translated into station capabilities and net increased kwhr production. These are evaluated for comparison with the cost of owning and maintaining the cooling tower. This is done for several sizes of tower.

Although the computations are simple, the large number of combinations of variables is staggering. The time and cost make the computations impractical without an electronic computer. With this aid, the investigation is neither difficult, overly long, nor unduly expensive, compared with the cost of a wrong decision.

At Shawville Station, circulating water from the condensers flows into a sump on the shoreline of the pond just above the dam. Under adequate river-flow conditions, the water flows over a weir and into the pond. Several adjacent flashboards on the dam are partially lowered to induce the hot water to flow over the dam rather than mix with the cooler water of the pond. The station is not equipped to assure positive discharge of the hot water below the dam, an improvement yet to be made.

The sump serves also as the suction chamber for the cooling tower pumps. These pass hot water from the condenser over the cooling tower and return it to the pond. The cooling tower, having no collecting basin, stands directly over one edge of the pond. It was designed to handle about 54,000 gpm and to serve a two-unit station of 275-Mw capability whose cooling water requirement is about 135,000 gpm. Recent studies show that for various reasons, including increased local construction costs, a substantial addition to the station's installed capacity may be made before a second cooling tower can be justified.

Daily flow of the Susquehanna at Shawville has dropped as low as 30,000 gpm. At such times, 105,000 gpm must be recirculated at the station. As only 54,000 gpm can be passed over the cooling tower, 51,000 gpm is recirculated directly to the pond. There it mingles with the tower discharge and the river inflow before entering the intake. There is no probability of pond drawdown as long as the water returned to the river below the station remains in balance with the inflow from upstream and the cooling tower losses.

Uses Surface Cooling

Accordingly, river flow lessening has the effect of a progressive increase in intake temperature, as more and more of the water is recirculated. When recirculation is 54,000 gpm or less, all of it may be handled by the cooling tower, in which case the intake temperature increase would be negligible.

Shawville Station also takes advantage of cooling through evaporation from the pond's surface. The pond, extending about 1½ miles upstream, has an average width of about 250 ft. Thus the total surface for evaporative cooling is about 2-million sq ft.

Recirculated hot water from the Shawville condenser discharge outlet flows upstream past the circulating water inlet in a relatively thin surface layer. This phenomenon has been observed both here and elsewhere. Hot water, cooled by surface evaporation, drops to the pond's bottom, where it mixes with the river flow and returns to the inlet. Pond heat balance calculation results compared with observed temperatures indicate that good mixing is obtained and that mixture temperatures can be computed with reasonable accuracy.

But it has been found, too, that the flow over the dam is sometimes a mixture of hot and cold water. Positive provision to assure the discharge of all excess hot water below

Pennsylvania Electric Photo

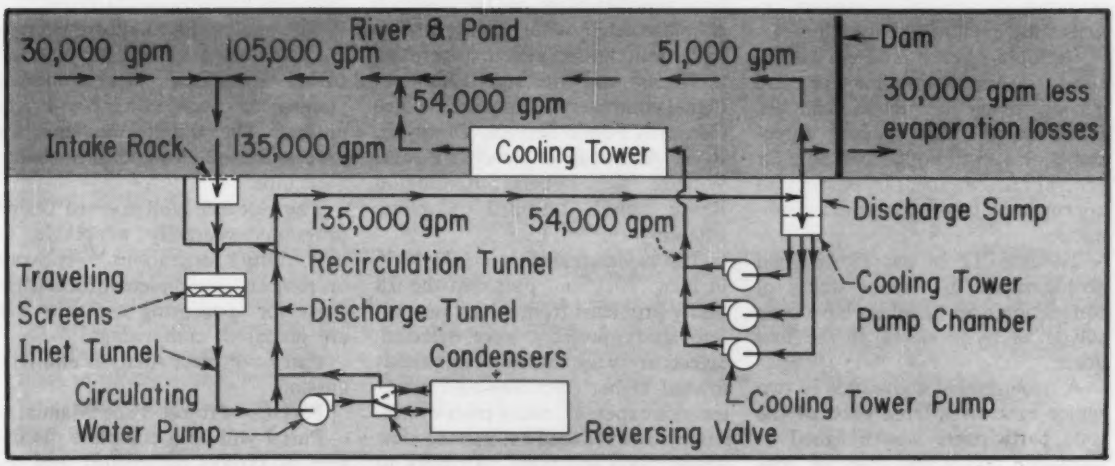
SEWARD STATION of Pennsylvania Electric Co also has cooling pond. The photo shows surface evaporation taking place, and the rising steam indicates just how far upstream hot water flows after discharge from the plant's condensers

the dam would improve cooling-pond effectiveness.

On occasional days throughout the year, river flow falls below the design requirements of the condensers. When water and air temperatures are low on such days, the fall in flow causes no operating problem, as the cooling effect of the inflow plus evaporative cooling from the pond is relatively high. If necessary, circulating water flow can be throttled to take advantage of the greater temperature rise possible with low intake temperature. Extremely low flow is infrequent in the cooler seasons, and average flow is generally well above the 24-hr minimum.

Releases Full Capacity

Cooling from the inflow and from evaporation are not adequate during low flow in the warm months. In the worst summer conditions on record the natural river flow at Shawville would have supported only about 75 Mw of capacity without throttling circulating water or benefiting from evaporative cooling. Throttling, together with maximum evaporative cooling, allow not more than another 125 Mw, a total of 200 Mw, and such operation involves high back pressure in the condenser (approximately 5 in. Hg). The remaining station capacity could not be used without the supplementary cooling provided by the tower.



DAILY FLOW FALLING to 30,000 gpm requires that 105,000 gpm be recirculated. As only 54,000 gpm can be passed through the cooling tower facility, 51,000 gpm of the condenser discharge is circulated to the station's cooling pond

Arizona

ARIZONA COMPUTER RESEARCH PROGRAM enters second year of study of feasibility of applying digital computer to utility problems. Edward Longacre, left, is project manager. With him are Leonard Capling, William Filbert, Dewey Root, all identified in the text

The Arizona Computer Research Program, investigating utility engineering and operating uses for Univac, has completed its first year of research at Phoenix, Ariz. Sponsored by Arizona Public Service Co, American & Foreign Power Co, Remington Rand Division of Sperry Rand Corp, and Ebasco Services, Inc (participating under separate agreement with Public Service), the project is believed to be the first joint effort to explore the use of an electronic computer in this field.

Eleven analysts, programmers and clerks are concentrating on the first group of problems selected from 78, including:

- Budgeting and forecasting, with emphasis on the exercise of budgetary controls.
- System operating problems involving interchange between interconnected systems, and planning of economical system expansion to meet anticipated load growth.

Solutions of each problem will result in magnetic program tapes and accompanying instruction manuals. But under the intercompany agreements, these will not be available for general release except by unanimous approval of the management committee.

To date, 12 of the 78 assigned problems are in various stages of completion, and 12 others have been solved as by-products of the first dozen.

A management committee of two senior executives from each of the four participants was assigned to formulate policy and exercise general project direction. This committee appointed K. S. Field, Ebasco, as project director, to coordinate the work under the committee's general direction. Phoenix was selected as the location for the working staff. Here's why:

Arizona Public Service was installing its Remington Rand Univac-I general purpose electronic digital computer system for early 1957 operation. The computer would be available to the research staff. Trained Public Service and Rem-Rand computer personnel would be available in an advisory capacity. Public Service's complex transmission network, involving interchange contracts with the US Bureau of Reclamation, Arizona Power Authority, and Salt River Power District, would provide ideal source data on system operating problems.

What Programming Involves

Each sponsoring company's full-time representative on the research staff was selected for his experience and training in system operating problems and the application of digital computers. These are: Vince Converti, Public Service; Dewey E. Root, American & Foreign Power; William C. Filbert, Remington Rand; and Leonard Capling, Ebasco.

The research staff met July 1956 in New York and prepared the 78 utility problems from which immediate study projects were selected. Selection was based on trends toward higher operating and maintenance expenses, rising costs of new money, and reduced net income after depreciation and taxes. All work to date has been related to electric system operations. Gas utility problems will be considered later.

Before setting up in Phoenix, company representatives and the project director took an intensified, two-week training course on Univac programming and coding. "Programming" involves statement, in minute detail and logical sequence, of each step in a problem's solution. "Coding" is translation of these steps into computer language.

Successful problem solution depends upon the analysts' development of the sequential steps through which the computer can operate for achieving desired results. Computer failure invariably results when the programmer and analyst fail to recognize problem intricacies which are often bypassed in the methods. Except in choosing between alternative paths, a computer exercises no judgment, and its fantastic speed and accuracy in calculating well conceived data eliminates personal error.

The analyst formulates the problem's mathematics into a "process" easing translation into computer "language," such as Univac-I language. The input medium for process instructions and data is magnetic tape.

The research staff tries to design programs generally adaptable to any utility's operations. As work on projects is completed, formal reports for sponsoring company use are prepared; comprising:

Part I—Project Analysis and Discussion

Part II—Project Tape Manual

Part I will be a complete discussion of project parameters and research, and bibliography. Part II will detail flow charts and instruc-

Computer Study Goes into Second Year

tions on each "run" or "pass" of data through the computer. The tape manual will be important in future application to specific problems.

During the first year, effort was concentrated on such electric system problems as follow:

- Analysis of system input, including development of load-duration and power-energy curves.
- System power flow studies generally made on ac and dc network analyzers.
- Development of transmission system loss formulas with the digital computer.
- Development of interconnected systems' loss formula.
- Power plant economic loading.
- Preparation of annual forecasts by Federal Power Commission customer classification of revenues, numbers of customers, and energy sales.

In addition to these projects, some nearing completion, analysis has begun to determine the possible extent of Univac use in:

- Distribution transformer loadings developed from customer billing records.
- Development of heat balance study techniques for power plant design and operations.

An outline of considerations and work on some projects illustrates research in progress.

Development of programs for analyzing power and energy inputs to complex systems, such as Arizona Public Services. These use the same data needed for development of load-duration and power-energy curves for system parts and for the whole.

Public Service has interconnections with USBR and Salt River Power District, and contracts with the Arizona Power Authority. There are about 60 input and load locations to be considered in any power flow analysis within the transmission network.

These complications bring delays in obtaining data, now processed manually. As a consequence only each month's peak day is analyzed. The Univac program will facilitate analysis of hourly inputs for each day of the month. It also will provide valuable data for administration of system operations under contractual agreements, aiding future interchange negotiations.

Much work has been done on system power flow studies on other computers. But it is believed that refinements made in developing the Univac program will prove a valuable contribution. This program is built around the "nodal" method, utilizing the iterative process with overcorrection and acceleration. The program simplifies the preparation of input data and provides output data in usable tabular form. It will handle a 100-bus network system. Within the program, data are produced for use in loss formula development. Service routines incorporated in the program permit altering input data to allow for changes in system conditions, such as addition or deletion of transmission lines and changes in loading and generating schedules. Thus the program automatically proceeds from case to case.

System loss formulas have been developed using network analyzers in conjunction with digital computers. Recently developed techniques now make it feasible and economical to develop loss formulas entirely with digital computers. A program is being designed, utilizing the iteration process for loss formula development, premised on power flow program work.

Important here are "canned" routines available from RemRand for such processes as matrix inversion. Using these routines, subprograms have been developed for mesh-star and impedance-admittance conversions in both directions. In all, six subprograms have been produced as "by-products" of the study's main-chain process. They will be useful in future studies.

Leading directly from the system loss study, preliminary work has begun in developing interconnected system loss formulas, particularly important for both generation and transmission losses in today's complex interconnected systems.

The next logical step is development of programs for determining power plant economic loading schedules, which will take into account energy sales forecasts, distribution and transmission system losses, production costs, and economics of power interchange.

Management planning utilizes forecasts of operating revenue, energy sales, and numbers of customers, based on historical trend data. The computer will not forecast, but will provide an easier way to accumulate historical data, and—for what it's worth—will produce a trend therefrom. It will provide data also for exercising budgetary controls to achieve management's objectives for a year's operation, and for capitalizing on unforeseen factors affecting economic stability of the utility's service area.

Without the computer, preparation of these data for towns, operating districts, or divisions is time-consuming and often economically impracticable by long-hand methods.

Trends Are Developed

Univac-I programs being developed in this area are based on the analysis of monthly and annual figures of the current and previous five years for each arbitrarily selected area division. From these data, further trends and deviation-from-trend ratios are developed. The historical data and the trends are used in preparing preliminary forecasts for the ensuing year. Data and forecasts can be supplied to "line" personnel, responsible for preparing final forecasts. It appears that the Univac will effect appreciable economies in such forecasting and can be extended to operating expenses and other elements in yearly or long-range forecasts.

Obviously, answers are not preconceived. Though findings could be adverse, the economic feasibility of using a large-scale digital electronic computer, such as Univac-I, for studies mentioned appears desirable and economical.

AUTOMATIC TUBE MILL at Sault Ste. Marie, Ontario, turns out hot rolled seamless steel tubing for boiler construction

MAIN SUBSTATION is assembly of 4.16-kv air circuit breakers. 1,000-kva unit sub supplies 480 v for motor control

Simple Radials Can Be Reliable

• They are designed to meet the special requirements of each manufacturing plant, and . . .

• They are properly protected through adequate relays and inherently reliable modern switchgear

E. J. BARTLEY, A. KETVIRTIS, and **I. S. COOPER,** Foundation of Canada Engineering Corp. Ltd, Toronto, Ont, Canada

Many industrial engineers, fearing outages, sacrifice to reliability the innate economy and simplicity of radial distribution systems. Instead, they choose the secondary selective or the network, more complex, costly systems but ones which they consider more trustworthy.

However, simple radial systems can be reliable, and industrial firms can cash in on their inherent economy.

A trustworthy simple radial has two strong qualities: It is properly designed to meet manufacturing requirements, and it is properly protected against trouble. These, at least, are conclusions that can be drawn from experience at Mannesmann Tube's new mill in Canada. The Editors

Successful operation of the mill necessitated high electrical reliability. This was achieved through adequate protective relaying, and use in the plant of modern electric equipment.

In choosing a distribution voltage, engineers considered:

- Purchasing power at 11 kv and distributing it at this voltage.
- Purchasing power at 115 kv and transforming it to a lower voltage for primary distribution.

At first glance, it appeared that the choice of 11 kv would be more economical because it would obviate a transformer station. But a careful analysis of relative costs of destribution switchgear, power cables, high-voltage motors and controls showed otherwise. For example, the cost of 11-kv motors and controls run 30% to 45% higher than for the same equipment in a 4.16-kv rating. So 115-kv supply was chosen instead; power is distributed at 4.16-kv, as shown in the one-line diagram of mill power distribution.

The 15,000-kva substation is situated about 600 ft from the mill. Power enters the plant through 12 single-conductor, 1,000-Mcm, paper-insulated, lead-covered cables buried in fiber ducts which are encased in a reinforced concrete envelope.

The 4.16-kv switchgear is an assembly of metal-clad, drawout-type air circuit breakers. Large motors are supplied directly at the primary distribution voltage, either from the switchgear or from fused air-break motor controllers.

Mill Makes Seamless Boiler Tubes

The distribution system described here is in a new, automatic, seamless-tube mill situated at Sault Ste. Marie, Ont. Owned by Mannesmann Tube Co, Ltd, this mill probably is the most automatic of its kind in the world.

Seamless tubes are produced here in a hot-rolling operation in which a hot steel billet is forced over a mandrel in the piercing mill. Then a plug mill and reelers give the tube its nominal size and smooth out wall irregularities, respectively. A sizing mill brings the tube within its prescribed tolerance range. The tube is cold-straightened, X-rayed, and tested.

Demand for seamless tubing is accelerating, for it is especially useful in the oil industry and high-pressure boiler construction.

MOTOR CONTROL CENTER is on platform in mill area. Conveyor motors are fed and controlled in groups from single contactors in centers

and Economic – If . . .

Feeders run from the switchgear to four 1,000-kva unit substations, which provide 480-v power for motor centers, lighting and house services.

Feeders also supply two 500-kv ignitron rectifier stations, which are connected by a tie line so that limited operations can continue if one unit fails. The rectifiers provide constant potential dc at 230 v. Fed by the 4.16-kv bus, two multi-unit m-g sets (each including a number of amplidyne regulators) provide control and excitation voltages for the mill drives.

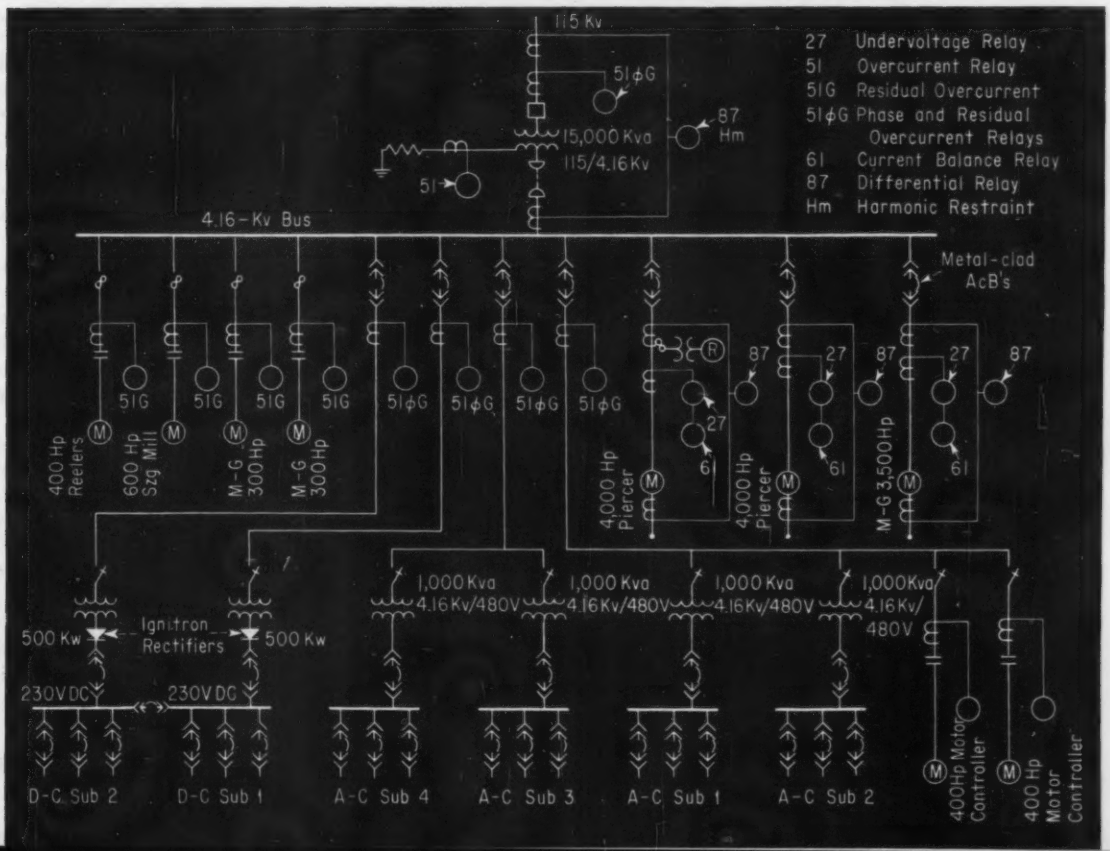
Paper-insulated, lead-covered cable carries the 4.16 kv through the plant, and thermoplastic-insulated wire is used for lower voltages. Tubular aluminum bus supplies the plug mill drive (two 2,000-hp dc motors), rated at about 2,500 amp.

The 480-v system neutral is grounded solidly, and the 4.16-kv system is grounded through an 800-amp resistor.

Basic protection on the high-voltage equipment is a set of high-speed differential relays with harmonic restraint. These are backed up by phase and residual over-current relays on the incoming 115-kv line, and an overcurrent relay on the neutral grounding resistor.

Each of these relays trips the incoming line breaker and opens all synchronous motor controllers. The differential zone includes the transformer and the underground cables to the switchgear. Thus, all functions of the main secondary breaker are covered except for protection against three-phase faults on the

115-KV SUPPLY with transformation to 4.16 kv for distribution was selected as most economical. Alternative was 11-kv supply and distribution. Largest motors are fed directly at 4.16 kv. Unit substations supply 480-v secondary voltage



switchgear bus. But chance of such faults—in modern metal-clad switchgear is so remote that this breaker was omitted.

Each 4.16-kv feeder is protected by phase and residual overcurrent relays. The piecer and plug mill m-g motors also have differential, undervoltage, and current-balance protection. Surge protection is achieved through lightning arresters and capacitors at each of these motors.

Since the ground fault current on the 4-kv motor feeders is limited to 800 amp, the motor controller fuses may not clear a line-to-ground fault fast enough. Therefore, this type of fault is detected by a residual relay and cleared by the contactor. Fuses operate only on 2- or 3-phase faults.

A short-circuit study of the system revealed that the interrupting capacity required at the 115-kv level is only 500 Mva. This is because power is supplied from an isolated system.

Relay settings were worked out conventionally. A typical example of the procedure in setting the phase overcurrent devices may be seen by following the path from the incoming line to the 480-v feeder breakers on substation 3;

Substation feeder breakers (D) are equipped with long-time-delay and instantaneous trips. Trips specified for the main substation breakers (C) were long-time-delay and short-time-delay so that it would coordinate with feeders. For the main breaker, an LTD trip of 1,600 amp (133% of full load) and an STD trip of 4,800 amp (400% of full load) were chosen.

Trial and Error

The substation branch breaker long-time-delay trips were calculated according to expected demand on each feeder. Instantaneous trips were checked for coordination with the short-time-delay trip of the main secondary breaker. It was found that the standard instantaneous trip range of 9 to 15 times the long-time-delay was suitable for all except the 500 and 600-amp breakers, which required a reduction to 4 to 8 times the long-time-delay.

This established the trip curves for all breakers on the 480-v system, and formed the basis for choosing the settings of the phase overcurrent relays in the substation feeder (B).

Since the main secondary breaker was set at less than 250% of transformer full-load current, it was possible to set the pickup of the primary feeder relays as high as six times full load. These relays must also:

- Protect the transformer against an overload 16.6 times full-load current for 4 sec, in accordance with Canadian Standards Assn test code.
- Clear the curve of the main secondary breaker by at least 16% in current, to maintain coordination under a two-phase fault on the substation secondary circuits.
- Allow substations 3 and 4 to carry a moderate overload.

Several trials resulted in the choice of a pickup setting of 5.2 times transformers full-load current.

These feeder relays were also equipped with instantaneous trips set at a value which would not cross into the instantaneous trip area of the 480-v breakers. Instantaneous trips of the relays protecting the feeder to substations 1 and 2 were disconnected to avoid a "race" between the relays themselves and the instantaneous fuses in series with them in 400-hp motor controllers.

Incoming line relays (A) had to meet the following conditions:

- In the absence of a main secondary breaker, be set at less than 250% of transformer full-load.
- Protect the transformer against an overload of 16.6 times full-load current for 5 sec.
- Clear the feeder relay curve by at least 0.4 sec to allow time for the feeder breaker to trip.

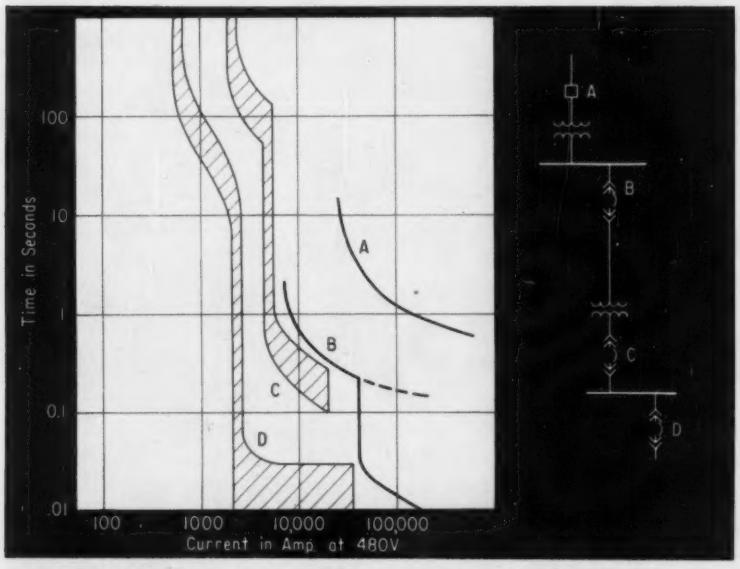
This relay was also set by trial and error, at about 125% of transformer full load. Its curve was plotted against the curves of all other trip devices in the 4.16-kv system.

The method followed in setting ground current relays was similar, except that in each case only two relays in series had to be coordinated —the 4.16-kv feeder relay and the transformer neutral relay. The setting of the residual relay in the incoming line was determined in relation to the utility's relaying scheme.

In choosing cable sizes, consideration was given not only to current-carrying capacity and voltage drop, but also to the possibility of overheating during fault conditions. Therefore the heating curve of each cable was plotted against the time-current characteristic of the device which protects it.

Differential relays were set in the usual manner so that no false tripping would occur because of the difference in primary and secondary currents, or because of saturation error resulting from the difference in burden on each side.

This distribution system with its modern equipment and protective devices has yielded the desired reliable service required to make the mill operation successful.



PHASE OVERCURRENT settings permit 5.6 times transformer full load current at substation feeder breaker B, 125% of full load on incoming lines breaker A

Now! At Load Bonus Settings, General Electric's new ML-32 Voltage Regulator . . .

IGNORES SHORT CIRCUITS

By D. D. MacCarthy, Manager—
Feeder Voltage Regulator Engineering,
General Electric Company.

With the advent of Load Bonus, which G.E. introduced last year, some utilities asked what effect short circuits would have on regulators operating on higher current settings. Now we can give this quick and categorical answer:

General Electric ML-32 step regulators will withstand short-circuit currents up to 25 times the increased current at each Load Bonus setting for the time durations tabulated below.

Load Bonus, of course, means that, at ±5% regulation, G-E ML-32 single-phase step voltage regulators are suitable for currents up to 160% of rating, to a maximum of 400 amperes.

Now, the ML-32's extra short-circuit strength allows you to take full economic advantage of the 60% Load Bonus feature in applications where previously short-circuit capacity has been a limitation. Check the chart below. You will note that, in all cases, the ML-32 regulator will withstand short circuits long enough for circuit-interrupting devices to go into action.

For more information on the ML-32, write Section 423-16, General Electric Co., Schenectady 5, N. Y. or contact your General Electric sales office or agent.

Add load, maintain short-circuit capacity:

Regulating Range (Percent)	Load Bonus Current* (% of basic rated current)	Short-circuit Capacity** (% of basic rated current)	Short-circuit Duration (Seconds)
±10	100%	100% x 25	2.0
± 8¾	110%	110% x 25	1.6
± 7½	120%	120% x 25	1.4
± 6¼	135%	135% x 25	1.1
± 5	160%	160% x 25	0.8

*400 amperes maximum
**10,000 amperes maximum

ML-32 step regulators will withstand short-circuit currents up to 25 times the increased current at each Load Bonus setting for the time durations tabulated at left.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Plow Speeds Line over Rough Terrain

VINCENT J. REILLY, Supt., Transportation Dept., New Jersey Power & Light Co, Denville, N. J.

When a rich lode was discovered recently on a large iron mining property, some 4 miles north of the original Mt. Hope mine, New Jersey Power & Light Co was requested to furnish 34.5-kv electric service to the new lode. Responding to this request meant construction of transmission lines over northwest New Jersey's rugged terrain.

The company's central garage department had developed a plow for digging counterpoise borders. Applied successfully in less difficult terrain, this plow faced a real challenge in plowing counterpoise to a depth of 34 in. over a distance of 4 miles.

As shown in the photo, the plow's bulldozer blade is at its highest position (34 in.) and its rooter is fully extended. The payout reel on the truck behind has the wire threaded through a sheave block. This wire is pulled down through the center of the hollow rooter and out through the bottom to a dead-end bar.

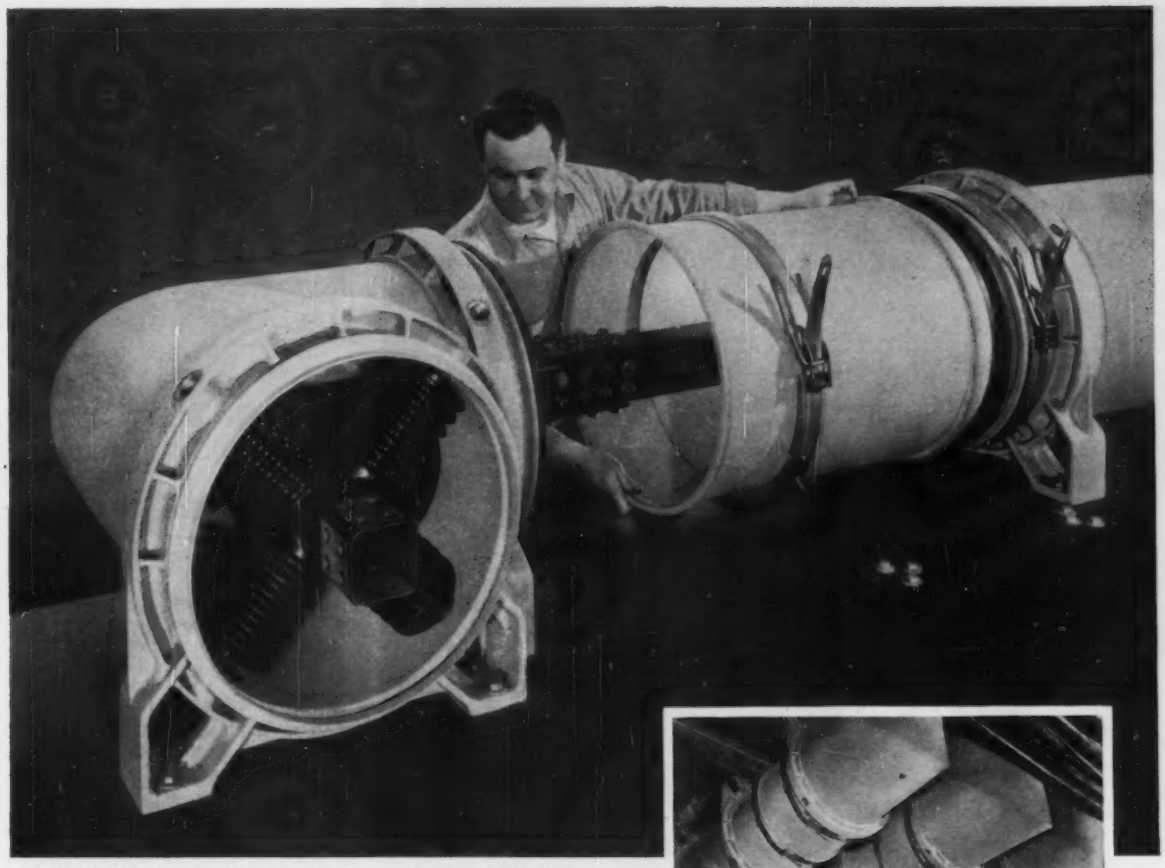
At the operation's start, the bulldozer blade is lowered, forcing the plow with the wire into the ground. The plow casing of the rooter is built from 1-in. steel plate. At the casing's bottom, an adapter fits the bulldozer blade. A top adapter fits the blade and is bolted to an angle bracket welded to the back of the blade. The plow can be dismantled by removing the single bolt from the top adapter.

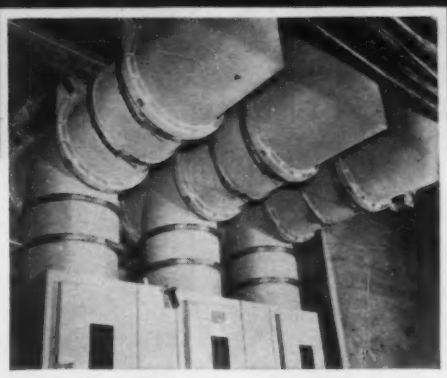
GENERATION—Operations

Special Enclosure Thaws Coal Cars

Photo shows inside of new coal car thawing house at Commonwealth Edison Co's Waukegan generating station. Heat is supplied by 130 oil burners spaced about 7 ft apart between rails. Heaters are fired by the ordinary gun-type oil burners, each burner being remotely controlled and automatically ignited.

(*More How To on page* 84)





Custom-built for specific requirements! Heat-treated cast aluminum alloy rings—welded to stationary tubular sections—replace ring gaskets. Porcelain insulators are in compression under normal loads and short circuits. Circular gaskets are fully trapped and self-seating.

For Reduced Installation and Maintenance Costs... DELTA-STAR Metal-Enclosed Isolated-Phase Buses

Delta-Star Metal-Enclosed Isolated-Phase Buses go up faster, and at less cost, than conventional units. Require less time for cleaning, inspection, and maintenance.

Your savings start at installation. Delta-Star pre-assembles 6- or 8-foot longitudinal sections and ships them in lengths as large as your facilities can handle. Ships corners and tees with bus and insulators installed. Reduces gasketing 50% by eliminating longitudinal gaskets.

Your savings continue year after year in inspection and maintenance. You easily remove the telescoping aluminum covers for inspection. You then have a 2'6" space for cleaning and maintenance.

Specially-shaped neoprene gaskets keep out dust and moisture. Spring-loaded clamping assures air-tight seal. Large area ring gaskets permit liberal misalignment of ducts without reducing seal.

For your next installation, check the Delta-Star Isolated-Phase Buses. For full details, call our nearest district representative or write *Delta-Star Electric Division, H. K. Porter Company, Inc., 2437 Fulton Street, Chicago 12, Ill. District offices in principal cities.*

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Connors Steel, Delta-Star Electric, Disston, Forge and Fittings, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, H. K. Porter Company (Canada) Ltd.

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Westinghouse representative

about the exclusive benefits

you get from

URL and URF REGULATORS...

WITH ALL THREE FEATURES

FOR CLOSER REGULATION

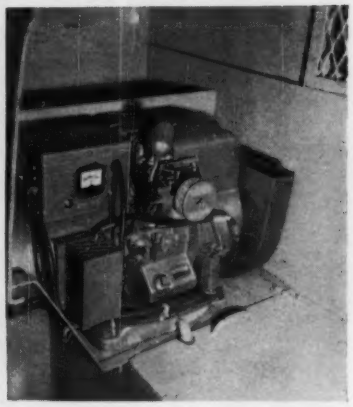
Westinghouse URL and URF regulators — with the complete combination of 1¼% step voltage regulation, inverse time delay relay and the instant-response tap changer — hold set voltages with *only ⅓ to ½ the voltage error of any other regulator.*

This means that you can carry greater loads and produce more revenue . . . because:

- The narrower effective bandwidth allows lines to be stretched further — without additional regulators.
- Reduced voltage error permits existing lines to be loaded heavier — without the expense of additional lines.
- Corrective operations are reduced by 42%, contact erosion cut 15% — substantial savings in maintenance.

Call your Westinghouse representative for the complete story of the benefits of better regulation . . . made possible by PLOWBACK OF EARNINGS into further investigations of the electric utilities' problems of electrical distribution. J-70858

YOU CAN BE SURE...IF IT'S Westinghouse



Gas-Engine Battery Charger Boosts Line Truck Mileage

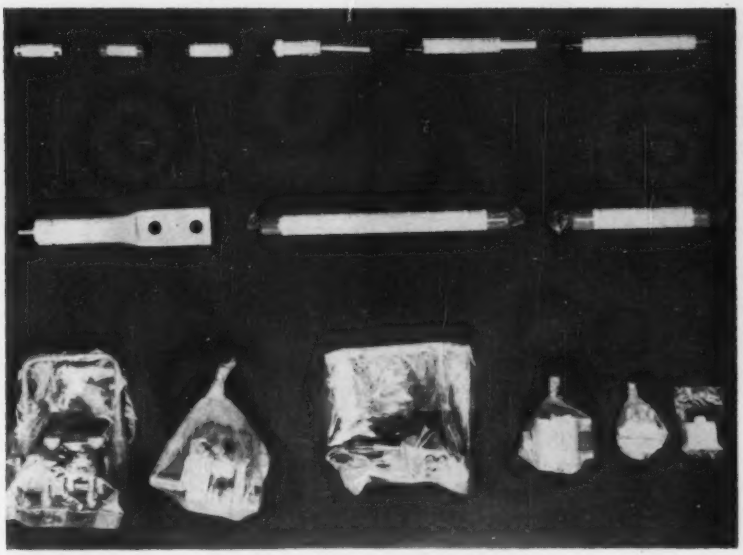
L. F. ROHAN, Garage Superintendent, Portland General Electric Co, Portland, Ore.

Gas mileage of line trucks increased from less than 1 mpg to almost 5 mpg when Portland General Electric Co installed gasoline-engine battery chargers.

Formerly, the truck engine had to be idled to keep its battery charged when two-way radios were used. Now, during working stops, the driver simply turns on the battery charger. In addition to saving gas, battery life has doubled, and charger set maintenance is more than offset by reduced truck engine wear.

The chargers are 2.5-hp, 4-cycle, 1-cylinder, air-cooled engines with integral 700-w, 6-v or 500-w, 12-v, dc generators. Ignition system is radio-shielded. A two-step adjustable voltage regulator protects radio equipment and battery. The set, mounted in the truck body, is started remotely from the cab, using the generator as a cranking motor. Fuel is drawn from the truck's gas tank. Output is 0.3 kwhr per gal, or better.

PGE has eight of these trucks in service, some for over two years. No maintenance has been necessary to date, but overhauls, scheduled for 3,000 hr, should cost $50-75 plus parts. Service life is estimated at about 10 yr. With truck engine wear reduced by an equivalent of 100,000 miles for each 3,000 hr of generator usage, the maintenance advantage is apparent.



READY-TO-USE connectors and clamps come packed with inhibitor and sealed against dirt. This, sealed along with neater wire preparation, helps insure long service

Fittings Ease Field Work

Vepco buys aluminum connectors and clamps factory-packed with inhibitor. Extra cost is 4¢ per connector, but only one-third the cost of cleaning and inhibiting in the field

ROBERT L. WALKER, JR, Overhead Engineer, Engineering & Costruction Dept, Virginia Electric & Power Co, Richmond, Va.

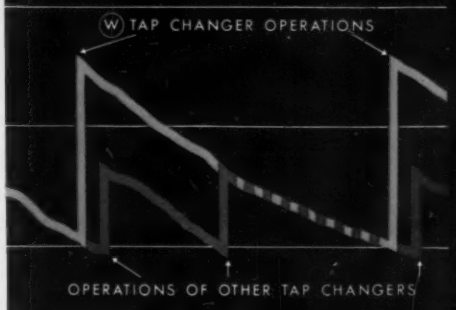
Aluminum connectors and hot-line clamps factory-packed with inhibitor and packaged to keep dirt out are being used by Virginia Electric & Power Co. For this service, manufacturers charge about 4¢ per connector, but this is only one-third the cost of cleaning and inhibiting a connector in the field.

Ready-to-use connectors and clamps offer a partial solution to the problem of getting linemen to apply connectors properly. Often conductors and connectors were not wire-brushed or covered with inhibitor. Such connectors usually failed in a few years. Vepco negotiated with manufacturers for a liberal quantity of inhibitor to be packed into the grooves of connectors and sleeves. To kept dirt out, the connector also was to be sealed either with a cap or in a plastic bag.

Aluminum fittings thus protected are the compression service sleeves and connectors, non-tension compression sleeves, mechanical connectors, hot-line and stirrup-type clamps, and compression-type and mechanical-type switch lugs. Reclaimed mechanical connectors soon will be protected in the same way. Vepco is setting up facilities in its salvage shop to clean good connectors chemically, apply inhibitor, and package them.

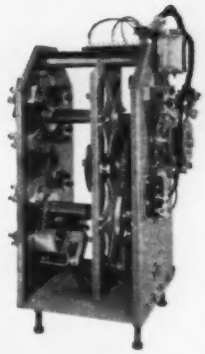
Use of inhibited, packaged connectors does not obviate cleaning and application of inhibitor to the conductor. However this operation has been made easier through use of squeeze-bottle inhibitor containers and forked wire brushes. These brushes can be used manually on a handle or on a hot stick.

BETTER
REGULATION
DEMANDS
ALL THREE



1¼% step regulation

Inverse time delay relay



Instant-response tap changer

. . . and only Westinghouse has all three. J-70857

YOU CAN BE SURE...IF IT'S
Westinghouse

Architects' Eye-View of 'Electri-Living' Home

'LIVING for Young Homemakers' asks what the future holds in residential electrical features. Answers from 12 of the country's leading young architects run the gamut from central heat pumps to hi-fi to garbage disposers

What electrical appliances and features will Americans most likely find in their homes of tomorrow?

Seeking answers to questions like this one, "Living for Young Homemakers" magazine recently polled some of the nation's better known young architects. The architects questioned, all participants in Living's "Electri-Living Homes" program, came up with an assortment of answers, some of which throw interesting lights on the domesticity of Mrs. America, 1970.

Wiring & Mortgages

Beginning right in its New York office, LYH went to staff architect R. M. Engelbrecht. Aside from his comments on future appliances in the Electri-Living home, architect Engelbrecht's most incisive point: the relation between adequate wiring and house mortgage. Said Engelbrecht: "We must overcome the tendency to skimp on wiring. To have an obsolete wiring system after only a fraction of the life of the mortgage is absurd. It's bad business to have the value of the wiring system be less than that part of the mortagage chargeable to it after the house is a few years old."

The constantly increasing importance of year-round electric air conditioning is reflected in the remarks of North Carolina's Edward Lowenstein: "Electrical equipment which we feel is absolutely essential to an Electri-Living home would include:

"● Heat pump or integrated packaged air conditioning and heating.

"● Kitchen—Built-in and recessed electric range, food warmer, oven, refrigerator, dishwasher, disposal unit, and hood and ventilating fan.

"● Laundry—Combination washer-dryer and hand iron."

LIVING'S ENGELBRECHT: 'We must overcome skimping on wiring'

Lowenstein also called for some other equipment, including a hi-fi, an intercom, a fire alarm system and grounded receptacles. Although he admits they boost costs, he also likes the idea of a 3-phase service enerance, an outdoor lighting system and a well-integrated indoor one.

Inevitably the housewife must get her due. Said Boise, Idaho's J. M. LaMarche: "Without doubt, the electrical equipment to be most considered is that which will ease the housewife's work load. Electric radiant heating does this, and more, through elimination of cleaning problems and provision of a healthier environment." He, too, wants the "convenience" appliances and better, controllable lighting.

Cooperating on an Oklahoma Electri-Living home, Tulsa architect Wesley Crone and builder John Bullwinkle agree with the others on the basic electrical appliances for kitchens. Crone adds a thought by wanting their design incorporated into the overall architectural plan, not merely leaving a "hole in the house" for them. Bullwinkle combines his confidence in air condi-

ARCHITECT, BUILDER and UTILITYMEN get together on site of North Carolina 'Electri-Living' Home. L to r, G. P. Smith, Duke Power Co, K. G. Phillips, II, Greensboro builder, J. A. Lowe, Duke Power, Edward Lowenstein, architect

(Continued on page 88)

NEW FROM VICTOR!

NO. 961 FOGBOWL SUSPENSION

Specially designed for fog and smog contaminated areas, this brand new product of VICTOR research was created to satisfy a critical need. The new No. 961 suspension has the *lowest* leakage current and the *lowest* radio interference level of any other type or make of fogbowl suspension insulator used in contaminated areas.

Low surge and leakage currents contribute to many desirable advantages of this insulator—particularly the elimination of wood cross-arm burning. These exceptional features have been proved not only in VICTOR'S own electrical laboratory, but by extensive service on lines in locations where contamination is a serious hazard.

If your service depends on protection against fog, smog and industrial contamination, here is your answer—VICTOR'S new No. 961 Fogbowl Suspension. You can't buy better—at any price!

VICTOR INSULATORS DIVISION

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LaMARCHE TAYLOR HAMPTON COOPER

tioning's future with a smart selling feature by putting in all necessary wiring and plumbing for the air conditioning equipment because "the fact that it may be installed at a later date with only the cost of equipment and hookup makes it attractive to most buyers."

Appliances, as to be expected, got the most attention. A tabulation of what they thought the architects considered important (leaving out the taken-for-granted refrigerator) would look like this:

- Electric range and oven.
- Dishwasher and disposal unit.
- Washer-dryer combination.
- Air conditioning and ventilation.

But if appliances and air conditioning come in for the lion's share of the attention, they do not exclude everything else. Lighting was mentioned by almost every architect in one connection or another. Listen to Harwood Taylor of Houston's Neuhaus & Taylor: "I believe that great architectural effect may be achieved economically through dramatic lighting. From the architect's standpoint (and possible the client's), this might be more important than a dishwasher or a disposal or some other electrical appliance." And Tampa architect Mark Hampton: "We are trying to show the fact that lighting fixtures do not necessarily have to be a fixture 'in the center of the room', that light should be merely an effect of light with intensity only where it is needed rather than an overall bright lighting effect from one source. It is possible to this inexpensively with dimmers."

"Living for Young Homemakers" asked other questions, not specifically related to electrical features, but which had electrical implications. Examples. . . .

D. B. Cooper, Winter Haven, Florida: "Perhaps the most important single design feature in future homes will be provisions for informal living indoor and outdoor living, with the old family kitchen returning with a modern touch."

Harwood Taylor, again: "The one design feature I feel will be most important in the next ten years is the development of the entire site rather than just designing a structure to be placed on . . . possibly 25% . . . of the site." (Electrically heated sidewalks for snow melting.

Los Angeles architect **Stanford Adler** adds:" I consider the growing acceptance of modern contemporary styling to be the most important feature . . . there will be an increasing reaction to traditionalism in all forms of architecture, including residential construction . . . mechanization of the kitchen will increase as well as house size."

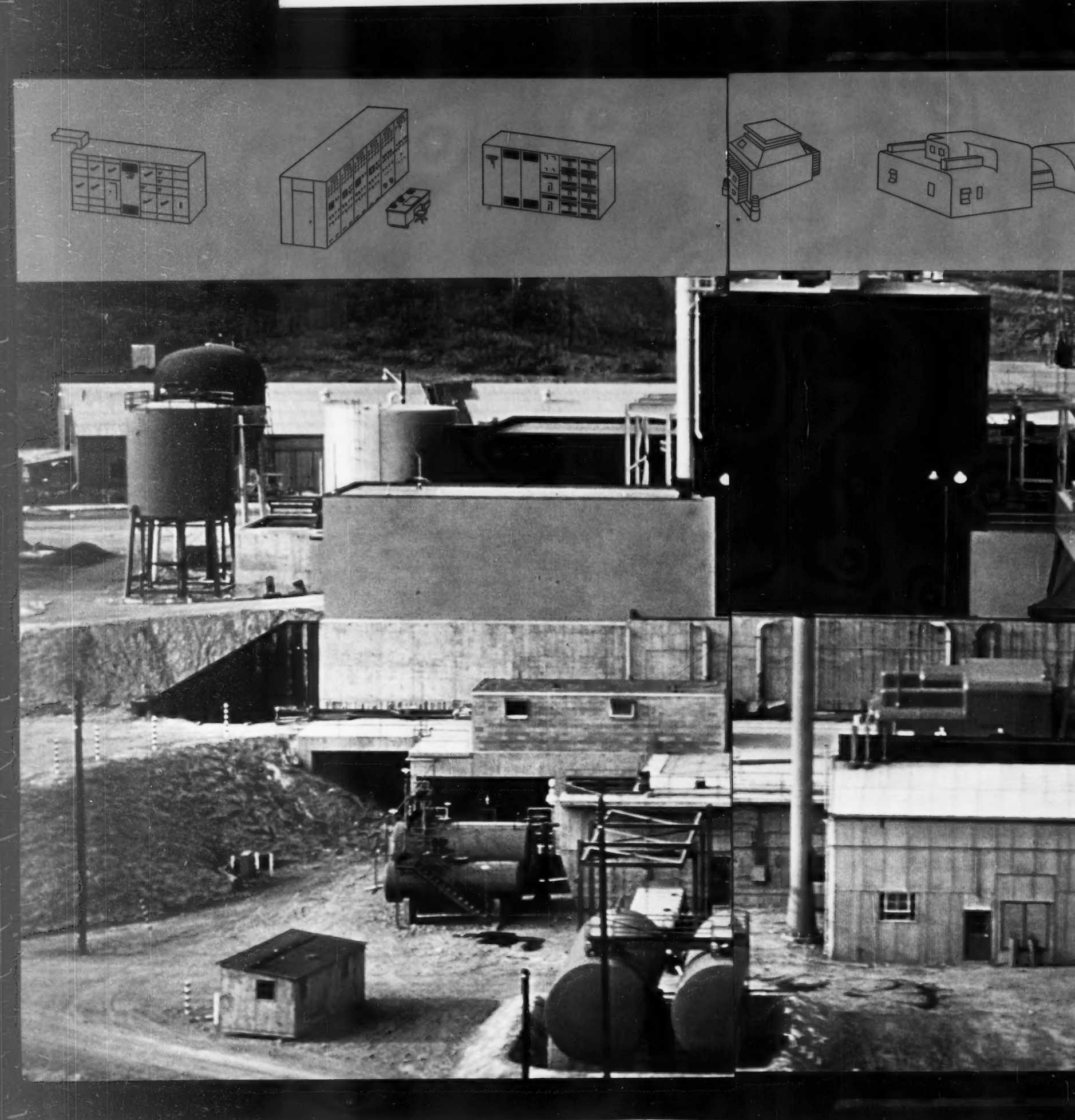
What does all this mean to utilities? Perhaps they already know, judging from cooperation they are lending to LYH and the architects in helping them build the 12 Electri-Living homes in various parts of the country. They are being built with utility support, and they help point the way to the industry goal of 10,000 kwhr per home.

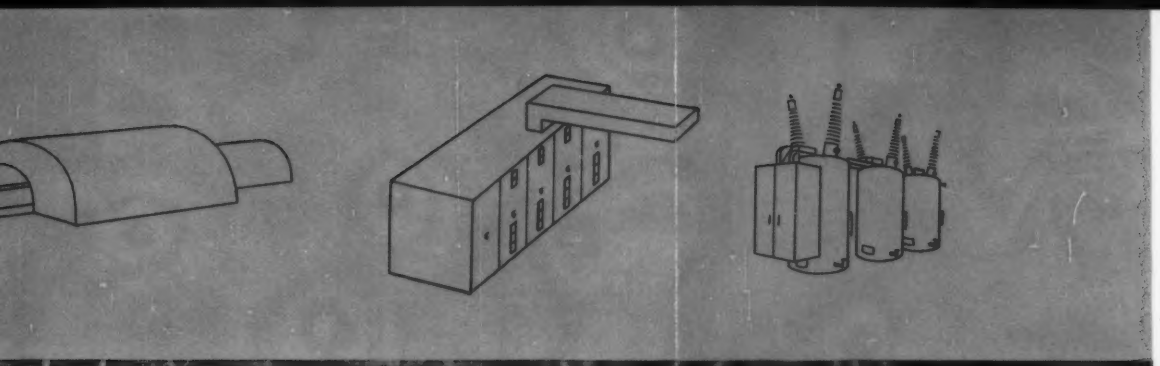
BULLWINKEL & CRONE: 'Appliance design to fit into architecture'

(*More Selling on page* 95)

SHIPPINGPORT, U.S.A.

World's first full-scale
atomic power station
devoted exclusively to peacetime needs





Westinghouse atomic reactor pours power into Pittsburgh area–industry, commerce, homes

One of the most important pieces of machinery in the history of American industry officially went on the line December 18, 1957, when the world's first full-scale atomic power reactor devoted exclusively to peacetime needs started to produce power at Shippingport, Pa.

Out of that generating station is coming the first large-scale production of electricity from the atom . . . but out of it also will come the answers to questions which are of the utmost importance to the electric utility industry.

For the answers to these and dozens of other questions, scientists, engineers, businessmen, utility executives and Government officials have been and will be intently watching the Shippingport reactor.

The development of the full potential of atomic energy as a source of electricity has been . . . and still is . . . a job of gigantic proportions, and that gives this pioneer plant an importance far beyond any foreseeable advances in the conventional power plant.

Westinghouse is proud to have played such an important part with the U. S. Atomic Energy Commission and Duquesne Light Company in this historic development.

The Shippingport plant is a joint venture of the Atomic Energy Commission and Duquesne Light Company. Westinghouse, under contract to the A.E.C., designed and developed the nuclear reactor. Duquesne Light built the electric generating portion of the plant and is operating the entire plant.

YOU CAN BE SURE...IF IT'S Westinghouse

CONGRATULATIONS TO DUQUESNE LIGHT COMPANY, PITTSBURGH, PA., on the starting of the world's first full-scale nuclear power generating station devoted exclusively to peacetime needs

At Shippingport, Pennsylvania, this joint project of the U. S. Atomic Energy Commission and the Duquesne Light Company is the world's first full-scale atomic power station devoted to nuclear power exclusively for civilian needs. Shippingport will be operated by the Duquesne Light Company.

Westinghouse designs, develops, coordinates, builds nuclear reactor and associated equipment

The Shippingport plant is the result of research, hard work and cooperation. Westinghouse designed and developed the nuclear reactor under contract to the Atomic Energy Commission, while Duquesne Light built the electric generating portion of the plant and is operating the entire plant.

FROM WESTINGHOUSE RESEARCH, ENGINEERING AND MANUFACTURING RESOURCES COMES EQUIPMENT FOR THE ATOMIC ELECTRIC POWER PLANT

In addition to the nuclear portion of Shippingport, Westinghouse supplied . . .

Turbine Generator	Instruments	Metal-Clad Switchgear
Power Breakers	Condenser and Condensate Pumps	Dry-Type Transformers
Control Centers		Protective Relays

from plowback of earnings into research and development

Westinghouse, leader in research and development of power apparatus for over 70 years, can provide you with a two-pronged advantage in the nuclear power field—Westinghouse research, engineering and manufacturing facilities for a complete line of power plant apparatus—and the longest record in successful atomic power development.

Westinghouse entered the nuclear field over 18 years ago with the first industrial atom smasher. To maintain this leadership, Westinghouse is currently building the first privately owned materials testing reactor. This is another step in the continuing program of development and testing of nuclear control and power generating apparatus. Today's most complete facilities are backed by years of laboratory and practical experience unexcelled in the industry.

YOU CAN BE SURE...IF IT'S Westinghouse

Section of the control
the world's first full-sc
voted exclusively to pea

THESE CONTROLS CHANNE NATURE'S BASIC FORCE INTO 60,000 kw OF COMME

Over-all coordinated operations center provide complete nuclear plant control and instrumen first full-scale atomic power plant

At Shippingport, Pennsylvania, one control room provides for the operation and control of the nuclear reactor, its associated equipment and the turbine generator. The electrical systems required for the control and instrumentation of the plant are designed into functional groupings in this key center.

The contro
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BUY EXPERIENCE . . . BUY WESTINGHOUS

Under contracts from a number of the world's leading electric utilities, Westinghouse is continuing the development of the full potential of atomic energy as a source of electric power. Outstanding among the domestic projects are:

Yankee Atomic Electric Company

A 134-mw plant being built near Rowe, Massachusetts, by 11 of New England's leading utilities. Scheduled to go on-line in 1960, this plant features a pressurized water reactor with stainless-steel-clad fuel elements. In addition to the nuclear steam generator, Westinghouse is supplying other major components for the plant.

Pennsylva

A partner wi
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Westinghous
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YOU CAN BE SURE...IF IT'S

control and instrumentation center of
t full-scale atomic power station, de-
y to peacetime needs, Shippingport, Pa.

NEL

MERCIAL POWER

ovides
umentation for the world's

control and instrumentation devices are
ed in panels with their corresponding
es, meters, instruments and other oper-
controls on the console panels. All func-
are monitored at their respective console
by the operators.

IOUSE

sylvania Power and Light Company
tner with Westinghouse in the design study
large aqueous homogeneous reactor. This
f reactor anticipates a low fuel cost.

nghouse has pioneered many important
ating station developments and pioneered,
tomic power development. Westinghouse
ipped by experience in design and manu-
e to consult with you and to provide the
n power stations, nuclear or conventional.

CP-1049

...IF IT'S Westinghouse

Relays Bar Collision Damage on Conveyor

L. ALBERTSON, Supervisor, Sales Application Dept, Philadelphia Electric Co, Philadelphia, Pa.

An electric conveyor with automatic "traffic control" solved the problem of handling large stacks of sheet metal without danger of collision damage at Crown Cork & Seal Co's Can Division in Philadelphia. Approximately 178 ft long, it transports palletized stacks of sheets, weighing 2,500 to 3,000 lb, from a baking oven in the coating department to the feed end of an oven in the lithographing department.

The system includes one 2-hp master control motor, located near the loading end, and 13 ½-hp motors, spaced at 4-ft intervals along the last 50 ft of the conveyor. Each small motor is controlled by a relay which regulates the distance between the successive stacks to avoid collisions and to maintain progressive movement without traffic jams.

Each pallet is stopped automatically when it reaches the specified 4-ft separation, then started again when the preceding pallet begins to move. The conveyor is easily loaded and unloaded by lift trucks.

Among the other unusual features of the Crown plant are a 340-ton air-conditioning system and unique ventilation in the locker room. Each locker is individually vented by drawing air through vents in the bottom of the door and out the top. In addition to keeping the atmosphere pleasant and odor-free, it effectively dries work apparel and eliminates dampness.

Office lighting is another example of up-to-the-minute electrical installation. The 24,000-sq-ft area encompassing the general and private office areas is illuminated by a luminous ceiling with a total connected load of 80 kw. Specially engineered for uniformity, brightness, and minimum shadow, it produces 50 to 55-ft-c illumination.

THIRTEEN ½-HP MOTORS, individually controlled, maintain 4-ft space between pallets to prevent traffic jams or collisions

Induction Heater Trims Forging Costs $75 Per Hour

ROBERT L. SPENCER, Power Sales Engineer, Consumers' Power Co, Battle Creek, Mich.

A 100-kw induction heater for forging metal billets used in the manufacture of valves has paid big dividends at the Valve Division of Eaton Mfg Co, Battle Creek, Mich.

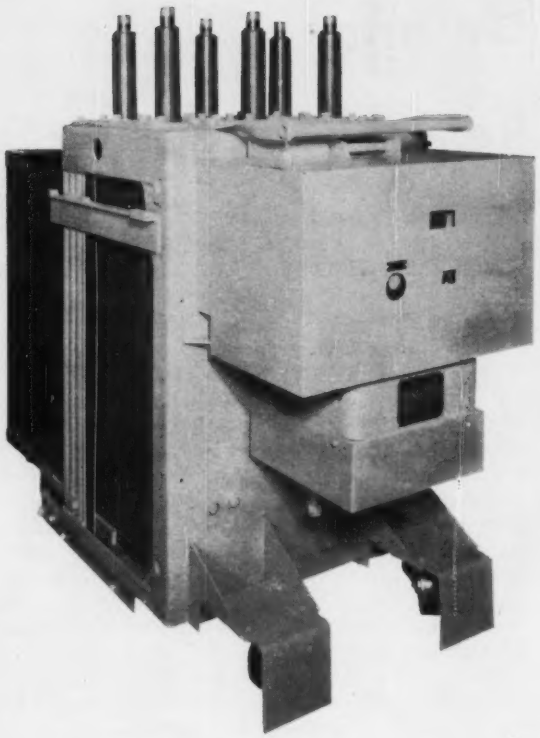
Tested in the company's forge shop, the induction heater provided closer temperature control than any method previously tried. Metal scaling is minimized, with a resultant increase in die life. Moreover, the heater takes less floor space and requires less labor to operate and maintain than any other method tried. The results: an estimated saving of $75 per production hour, compared with other types of heating.

The induction heater brings the ¼-lb billets up to a temperature of 1,700 to 2,000F in this initial forging. More than 1,600 types of valves are produced.

New Equipment

Magnetic Air Breakers . . .

. . . **with 2-cycle operation** are available in 13.8 and 4.16-kv ratings. Speed of operation reduces line burning, improves coordination with distribution protective devices, and provides better protection against conductor annealing during faults, which may impair mechanical strength. The metal-clad units are interchangeable with existing Magne-blast breakers of same rating.
General Electric Co, Schenectady 5, N. Y.



100-Kvar Capacitor . . .

. . . **in ratings from 4.8 through 7.96 kv** halves number of unit fuses and connections required. Offered in one- or two-bushing styles, it can be mounted in pole-type banks or stacking unit type substation racks.

Unit has same overall height, 33.5 in., and about same operating case temperatures as 50-kvar model. Features include high creepage solder-sealed porcelain bushings, vacuum impregnation, and 333-vpm dielectric stress. Weight is 260 lb; dimensions 5.5 x 25 x 26 in.
Cornell-Dubilier Electric Corp, South Plainfield, N. J.

1-Phase Transformer . . .

. . . **for power and lighting** use in 50 va to 500 kva range has dual primary and secondary windings. It can be used for 240-v, 3-wire services. Sound levels are low enough for indoor installations in locations where quiet operation is necessary. Coils are vacuum impregnated with a polymerizing varnish and blocked to withstand internal stress. High grade, non-aging, silicon steel assures low operating costs. Bulletin 100A has additional data.
Hevi-Duty Electric Co, 2040 W. Wisconsin Ave, Milwaukee 1, Wis.

Silicone Power Rectifier . . .

. . . **provides up to 12 amp** forward dc with a maximum peak inverse voltage up to 500 v. For high-tem-

(*Continued on page* 100)

Cable is a continuous run from the pole to the meter with no splices or taps. Because installation is quick and simple, the Company now strings 30-50% more services per day.

FOR RESIDENTIAL SERVICE

Kansas City Power & Light uses neoprene drop cable to speed installations, reduce contact danger

A single cable called the "Kansas City Service Drop" solved pole-to-home installation problems for Kansas City Power & Light Company. It is made of two hard-drawn aluminum conductors covered with Du Pont neoprene, and wrapped in aluminum ribbon which forms the cable jacket and acts as the neutral.

This attractive cable is made in easy-to-install small diameters. It withstands extremes of heat and cold. It reduces contact hazard to employees and customers; eliminates power theft; is easier to string through trees. The sawing action of the cable's concave aluminum ribbon makes it generally self-clearing.

Will it hold up? In a dielectric moisture test, one sample of cable immersed in water 2 days lasted as long as a dry sample. Both broke down at 21,000 volts. And when a recent tornado hit a Kansas City suburb, some of the cables in its path were whipped to the ground but were still in condition to deliver service.

This utility has 6 million feet of neoprene-covered cable in the air. And they're buying an added million feet a year. Neoprene's long-term reliability earned this confidence. Of all resilient materials, only neoprene offers balanced resistance to sunlight and weather, heat, chemicals, abrasion and cutting, flex cracking, aging and oxidation.

Ask your supplier about wire and cable jacketed with neoprene. It's available in single and multiple conductor types and voltage ratings to meet your requirements. Mail the coupon below to get the ELASTOMERS NOTEBOOK with actual on-the-job reports of neoprene's performance in a wide range of industrial products.

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Better things for better living
. . . through chemistry

NEOPRENE
— made by Du Pont for 25 years

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. EW-2
Wilmington 98, Delaware

Please put my name on the mailing list for the Elastomers Notebook.

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MAIL THIS COUPON NOW . . . WHILE YOU'RE THINKING ABOUT IT

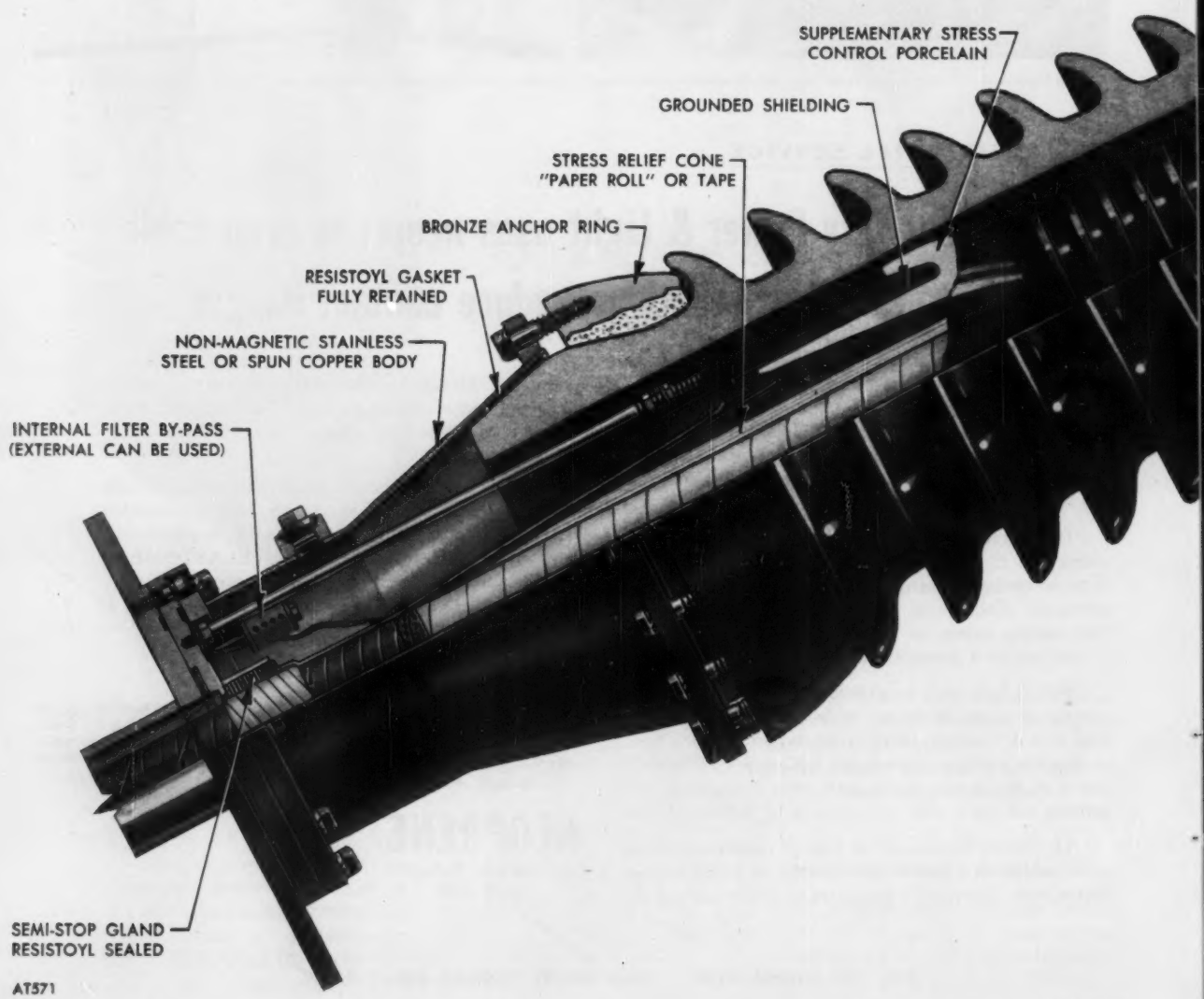
Specify safety, simplicity, ease of installation and maintenance with G&W high voltage (69 to 230kv) cable terminating devices

FEATURES

- SIMPLICITY — A minimum of parts, each designed for maximum function.
- VERSATILITY — Method of fabricating base readily adapts it to varying installation conditions.
- NO CASTINGS — Points withstanding pressure, top and bottom fittings, are fabricated non-magnetic stainless steel and spun copper to eliminate hazardous brittle, porous nature of castings that are susceptible to leaks.
- G&W tests exceed A.I.E.E. withstand tests

230kv pothead terminating 1/C, 500mcm, 230kv, PILC, HPOF cable	A.I.E.E. No. 48	Actual Tests
Impulse, 1.5 x 40ms	1050kv	1232kv
60 cycle, 1 minute dry	545kv	575kv
60 cycle, 10 seconds wet	445kv	545kv
60 cycle, 6 hours dry	315kv	340kv

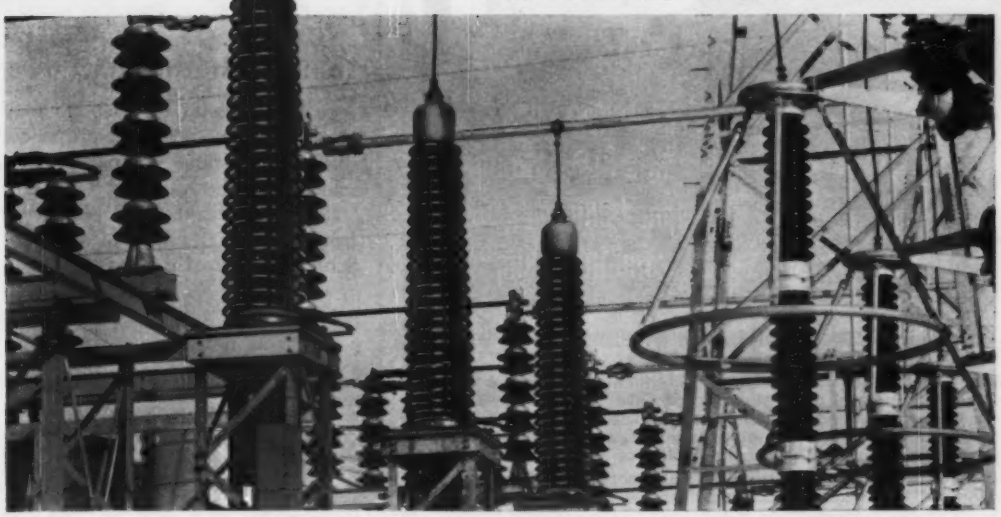
The sound engineering principles of G&W potheads will eliminate the complexities of your cable terminating problems. Their safety, ease of installation and minimum maintenance are essential requirements in which you'll be interested. Notice the features and overall design pioneered by G&W. Specify them with confidence in your plans for high or low pressure oil or gas filled cable systems.


SUPPLEMENTARY STRESS CONTROL PORCELAIN
GROUNDED SHIELDING
STRESS RELIEF CONE "PAPER ROLL" OR TAPE
BRONZE ANCHOR RING
RESISTOYL GASKET FULLY RETAINED
NON-MAGNETIC STAINLESS STEEL OR SPUN COPPER BODY
INTERNAL FILTER BY-PASS (EXTERNAL CAN BE USED)
SEMI-STOP GLAND RESISTOYL SEALED

AT571

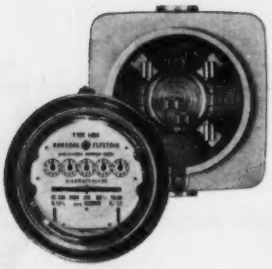
STANDARD VOLTAGE RATINGS AVAILABLE
69KV — 92KV — 115KV — 138KV — 161KV — 230KV

The first 230kv pothead installation in the U.S.A. — Garrison Dam, North Dakota. Potheads are installed in switchyard where oil pipe cable is brought from power house transformer deck.



G & W ELECTRIC SPECIALTY COMPANY
3500 W. 127th ST., BLUE ISLAND, ILLINOIS

Meter Performance Protected!



Every accurate meter deserves the protection of an S-1 Square Meter Socket that's precision-built to safeguard meter performance for 30 years or more. Ask your G-E salesman, he'll show you proof. (628-5)

GENERAL ELECTRIC

You can wrap up details fast on splicing and terminating needs with this handy, up-to-date aid in planning and ordering.

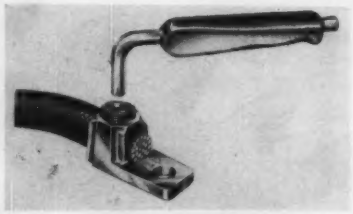
The PLM line includes a complete range of splicing accessories for making 2, 3 or 4-way splices in or to armored cable (both open and sealed types), non-metallic sheathed cable and lead-covered cable through 23 kv. Unit package kits contain all materials and instructions needed for building correctly designed splice or termination.

Save time and work in getting correct materials to the right place at the right time. Ask for copy of PLM catalog 301. PLM Products, Inc., 3873 W. 150th St., Cleveland 11, Ohio.

TERMINATORS · SPLICING KITS · CONDUIT VENTILATORS

perature applications, Type 304 operates at a junction temperature of 190C. Maximum reverse leakage is 10 ma at rated peak inverse voltage and maximum temperature. The rectifier case is the positive terminal and is plated to maintain low contact resistance. A $\frac{7}{16}$-in. threaded stud permits mounting in any position. Cells are available in complete bridge assemblies.

Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.



Cone-Screw Lugs . . .

. . . terminate copper cable, have heavy duty terminals with a positive wire-stop and cone-screw for faster, more secure installation. They are available in six sizes to cover cable from No. 14 AWG to 500 Mcm. The one-piece lugs are made of high conductivity copper with non-tarnishing, corrosion-proof finish. Every package of lugs contains hex socket installing wrench with plastic handle.

Thomas & Betts Co, 36 Butler St, Elizabeth, N. J.

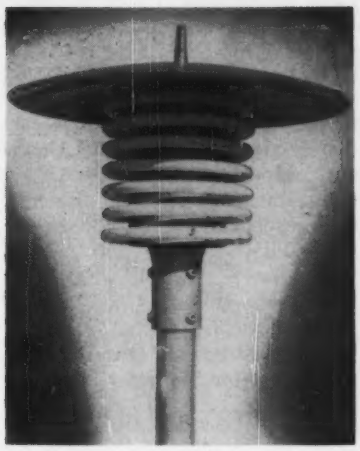
Tamper Attachment . . .

. . . for cranes, carrier-mounted crawler-mounted or self-propelled, offers 80 to 100% compaction at a maximum penetration of 3 ft. Operator has precision control for drops from 1 to 10 ft.

Schield Bantam Co, Waverly, Iowa

Circular Light . . .

. . . for outdoor applications such as parking lots and shopping centers, utilizes standard 40-w circular fluorescent lamps. Circa-Lite can accommodate up to 8 lamp "modules on each pole; light output can be varied from 2,500 to 20,000 lumens.



All component parts are aluminum. Poles permit mounting heights up to 20 ft and are available in three base styles, one of which is hinged so that the luminaire can be serviced from the ground.
Kenworth Co, Winstead 1, Minnesota

High Bay Reflectors . . .

. . . for 1-kw mercury vapor lamps are available in two models. Hibay No. 642 has open yoke construction suitable for turbine rooms and industrial plants with solid ceilings. No. 643 has protective drip shield, is suitable for areas having skylights, dormers, or sawtooth roofs. Units consist of ventilated socket yoke and covered reflector assembly, made of special prismatic glass to withstand high thermal shock of lamp.
Holophane Co, 342 Madison Ave, New York 17, N. Y.

Electric Receipter . . .

. . . records receipt of payment on post card type bills used with punched card tabulating systems. In less than one second, Model 225 perforates customers receipt with "Paid," date, location number, company initials, and tellers number; prints date and teller number on stub; and automatically detaches stub from receipt.
American Perforator Div, Heller Roberts Mfg Corp, 700 Jamaica Ave, Brooklyn 8, N. Y.
(*More New Equipment on page* 102)

NEW FROM KIDDE!

ALL-NEW DRY CHEMICAL EXTINGUISHER KILLS FIRE FASTER, EASIER!

Kidde's new pressurized dry chemical portables awarded top U.L. rating! This means you can attack flammable liquid or electrical fires with confidence. Automatic unlocking device and trigger control mean easier, faster operation. Just follow simple directions . . . REMOVE HORN, PULL TRIGGER – instantly dry chemical knocks out fires. Other new features include extra-large aluminum handle – use with gloves on. Center-balanced–easier to carry. The plastic-faced pressure gauge is recessed for protection, tells at a glance if unit is ready to use. Available in both 20 and 30 lb. capacities.

Kidde

Walter Kidde & Company, Inc., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd., Montreal—Toronto

FREE INFORMATION

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230 MAIN STREET, BELLEVILLE 9, N. J.

Check appropriate box, tear out, mail this coupon for prices, literature!

☐ Please send me your new P-40 fire extinguishing and detecting equipment catalog.

☐ Please send me prices and specifications for your new dry chemical extinguisher.

P-40 Catalog

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It's NEW!

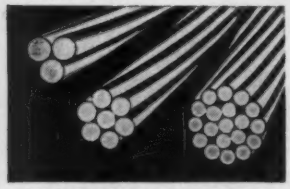
Wire that combines the strength of steel with the high corrosion resistance of aluminum

It's ACCO *Aluminized!*

PAGE STRAND

PAGE has successfully combined two time-tested metals into a revolutionary new wire—ACCO ALUMINIZED—that has a ductile, protective coating of aluminum *bonded* to iron and steel wire by a hot-dip method. This product is covered by and is manufactured under processes covered by U.S. and foreign patents.

Now PAGE offers ACCO ALUMINIZED Steel Strand for guy wire, ground wire and messenger wire applications. Can be used with Preformed Guy-Grip dead-ends made of ACCO ALUMINIZED Wire, or with galvanized pole hardware. Here is evidence of ACCO ALUMINIZED Steel Strand's superiority: salt spray tests conducted in strict accordance with ASTM procedures show that, for equal thickness of coating, aluminized *outlasts galvanized by more than 2 to 1.*



Also... PAGE *Aluminized* ACSR CORE WIRE

Aluminum Conductor Cable with PAGE ACCO ALUMINIZED ACSR Core Wire is now available from many manufacturers of conductor cable. Product quality control is assured by a special testing procedure mutually developed by PAGE and ALCOA.

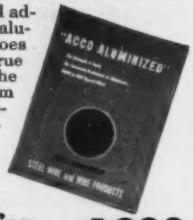
ALL STANDARD GRADES

PAGE ACCO ALUMINIZED Steel Strand is available in Common, Siemans-Martin, High Strength, Extra High Strength and Utility grades with physical properties meeting ASTM Spec. A-122-54-T and A-363-55-T.

NOTE: We will continue to make and market PAGE Stainless Steel Strand and PAGE Galvanized Strand, as heretofore, in 3-, 7- and 19-wire construction.

Send for Informative Booklet

How about ductility and adherence properties of aluminized wire? Why does aluminizing create a true duplex coating over the core? How does aluminum "sacrifice itself" to provide electrochemical protection? For answers, write us at Monessen, Pa., asking for Booklet DH537-A.



ACCO for Better Values

Page Steel and Wire Division
AMERICAN CHAIN & CABLE

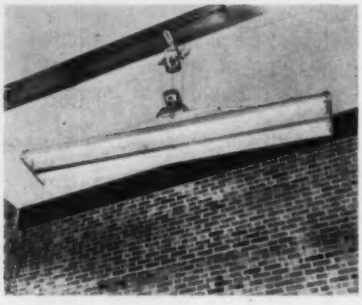
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

ACCO TRADE MARK

Gas Analyzer . . .

. . . provides continuous measurement of carbon dioxide in power plants, may also be used as safety device to monitor hydrogen in carbon dioxide purged systems. Designated Model 7C, it uses ultrasensitive filaments as detection elements. Cell response time is 30 sec for sample flow rates of 250 cc/min. Instrument is available with explosion proofing to meet Class I Group D requirements.

Process Instruments Div, Beckman Instrument Inc, Fullerton, Calif.



High-Bay Hanger . . .

. . . permits floor-level servicing of fluorescent, mercury, and incandescent fixtures weighing up to 120 lb. Trade-named Triplex, it has multiple-fall pulleys providing 3:1 mechanical advantage for handline operation. One unskilled workman can lower, re-lamp, clean, and re-position fixture in minutes. Fixture is completely de-energized during servicing. Available ratings include 15 amp at 600 v ac, 30 amp at 250 v ac, and 10 amp at 250 v dc.

Thompson Electric Co, Box 873-Z, Cleveland 22, Ohio

More New Products

Electronic **typing calculator** designed for invoice and order preparation consists of electric typewriter, ten-key companion keyboard, magnetic core "memory" within the computer unit, and program reading device.—International Business Machines Corp, 590 Madison Ave, New York 22, N. Y.

Two-kw **dc-to-ac converter** with output of 115-v or 230-v ac, single or 3 phase, is available for 1, 1.5, and 2-kw output. It operates from 32, 48, 64, 115 or 230-v dc; armature operating speed is 1800 rpm.—Carter Motor Co, 2711A W. George St, Chicago 18, Ill.

Non-metallic **safety hat** weighing less than 12½ oz tolerates prolonged temperatures from below −25 to +180F without distortion.—E. D. Bullard Co, 2680 Bridgeway, Sausalito, Calif.

Electric **winches** for cranes, derricks, and booms are available for 1½ to 35-hp motors. Line speeds are rated from 10 fpm with a 2,200 lb load to 35 fpm with a 22,000 lb load; cable capacities, from 320 to 885 ft.—Sasgen Derrick Co, Dept EWN, 3101 W. Grand Ave, Chicago 22, Ill.

Combination light and air **diffuser** for suspended ceilings delivers up to 150 cfm at normal temperatures. Available for 1x4 and 1x8-ft Rapid-Start and Slimline lamps.—Day-Brite Lighting, Inc, 16 N. 9th St, St. Louis, Mo.

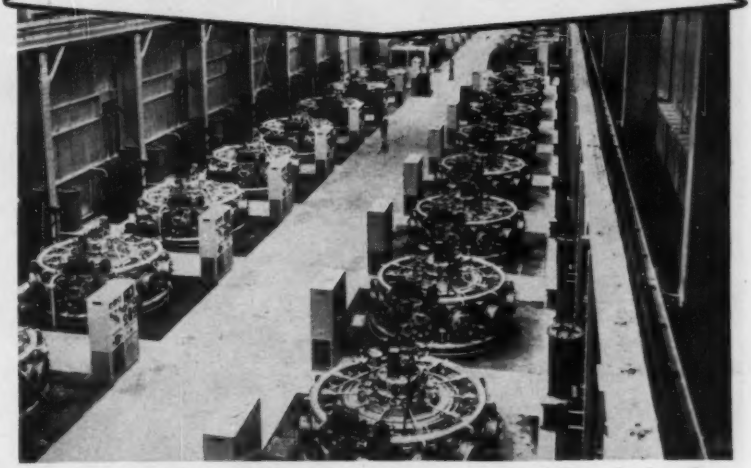
Rectangular or round **core tubes and coil forms** for Class H or Class B applications are offered with internal dimensions between 0.25 and 2 in. Wall is 0.030 in.; standard length, 25 in.—Silicone Insulation, 1383 Seabury Ave, Bronx 61, N. Y.

Electronic dial type **indicating potentiometer** can be read at long distances. May be used for measurement of temperature, speed, pressure, smoke density, and electrical variables.—The Bristol Co, Waterbury 20, Conn.

Series 3000 **toggle and trigger switches** for small motors have nominal 1-hp rating, 12 amp at 125 v, 6 amp at 250 v, ac or dc.—Sargent Electric Corp, 630 Merrick Rd, Lynbrook, N. Y.

Elapsed time indicators for 120 or 240 v are available in 3½-in. round, 3½-in. round shroud and 3½-in. rectangular cases.—Simpson Electric Co, 5200 W. Kinzie St, Chicago 44, Ill.

NELSON CONTROLS
govern power for aluminum plant



Nelson furnished 120 Engine Generator Control Boards for the new Port Lavaca, Texas Aluminum Reduction Plant of the Aluminum Company of America.
Nelson customers include 19 of the 30 largest American corporations. Alcoa, as one of these 19, depended on Nelson equipment for reliable, economical, electrical control.
These Alcoa-designed, custom built engine generator control boards provide automatic control of radial diesel engines and D.C. generators which provide the D.C. power for electrolytic reduction of aluminum.

THE FOLLOWING FEATURES ARE PROVIDED IN THESE BOARDS:

GENERATOR SECTION
(Shown at left of photo)

Breaker Control Switches

D.C. Ammeter and Voltmeter

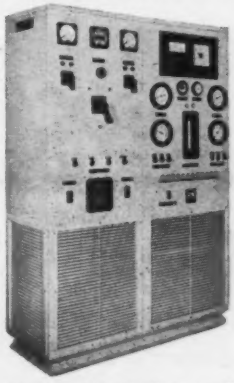
Electric Tachometer

Throttle Control Switch

Field Rheostat Regulation

Automatic Voltage Regulation

Emergency Shutdown



ENGINE SECTION
(shown at right of photo)

Cylinder Temperature Indicator (with alarm)

Oil Temperature and Pressure

Gas Pressure

Water Temperature and Pressure

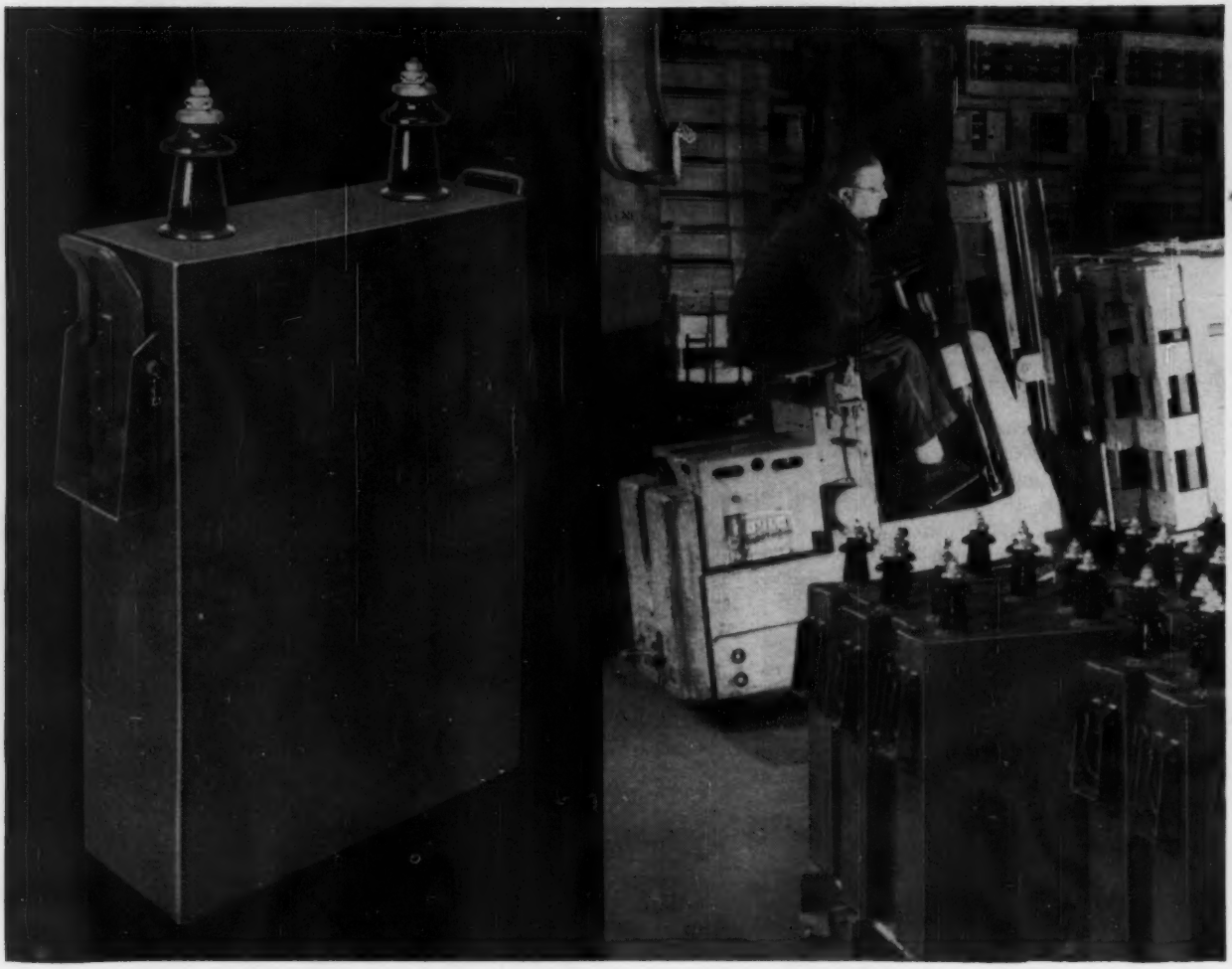
Scavenger Air Pressure

Automatic Control and Shutdown

The next time you have a project that includes instrument and control panels let us quote on requirements. Nelson is equipped to do all fabrication, wiring and piping, and factory test prior to shipment. Our engineers are qualified to handle both large and small jobs. For additional information please write the factory.

A major source of Electrical Control Equipment for Industry

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA



Another product of Plowback of Earnings into research

100-Kvar Capacitors Now Ready for Shipment

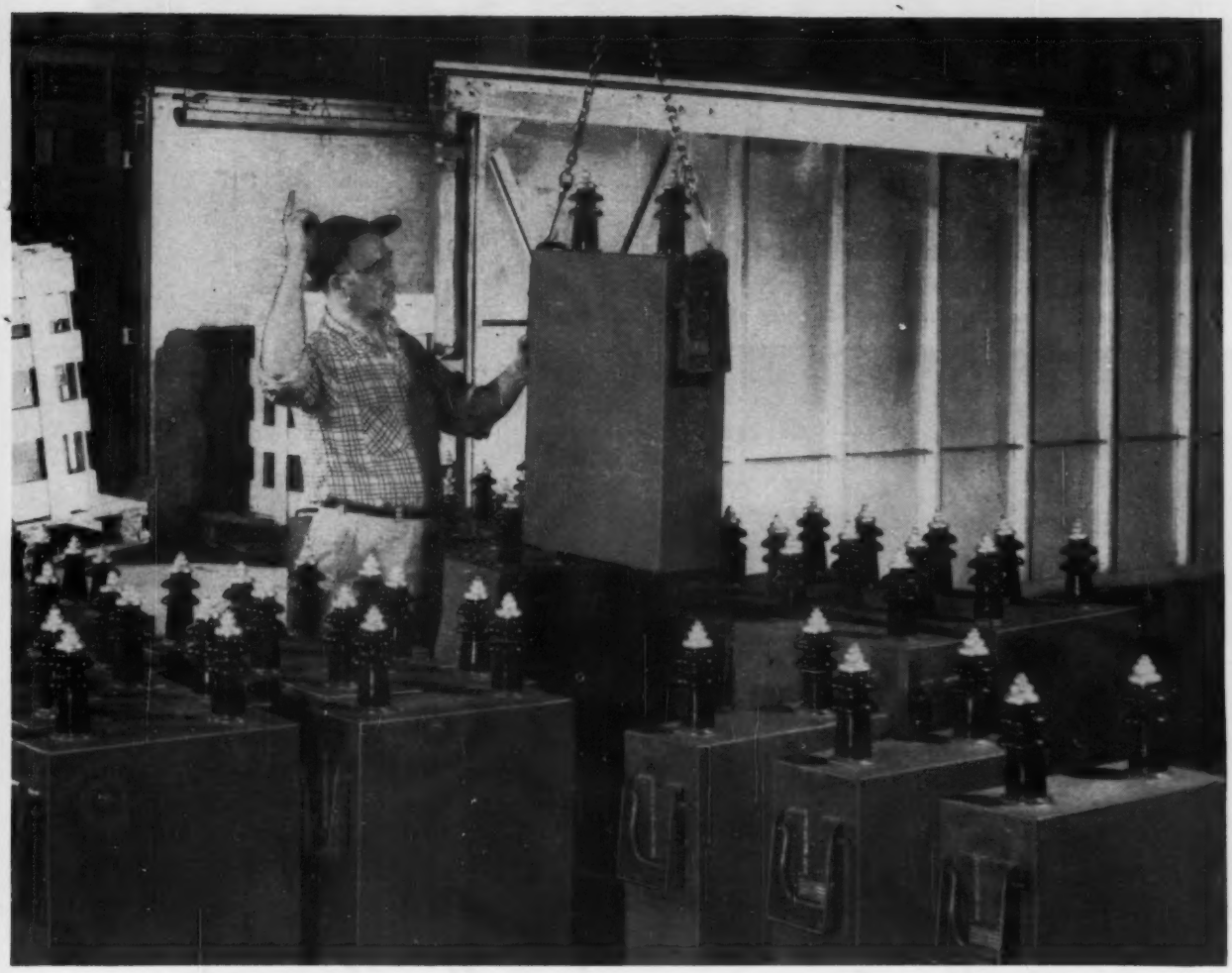
Anticipating the industry's need for larger blocks of reactive power, Westinghouse engineers developed this new 100-kilovar capacitor to boost kvar output per unit . . . *more economically* and conveniently than ever.

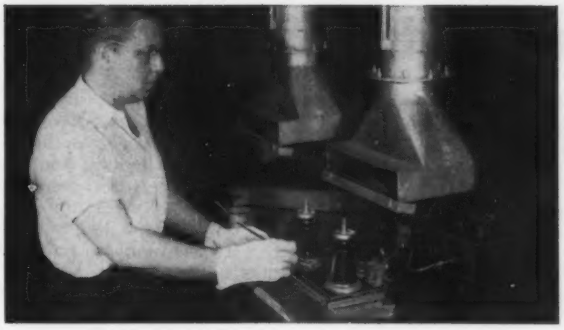
These units are in regular production, and shipments are being made to meet the tremendous demand expected for this new product.

Following the long-established policy of reinvestment of earnings for research, these new capacitors feature the high quality and outstanding performance always associated with Westinghouse capacitors. Continual testing during assembly assures top reliability . . . after years of service.

For complete information about the new 100-kvar capacitors and the way they can save you money, call your Westinghouse sales engineer or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60951

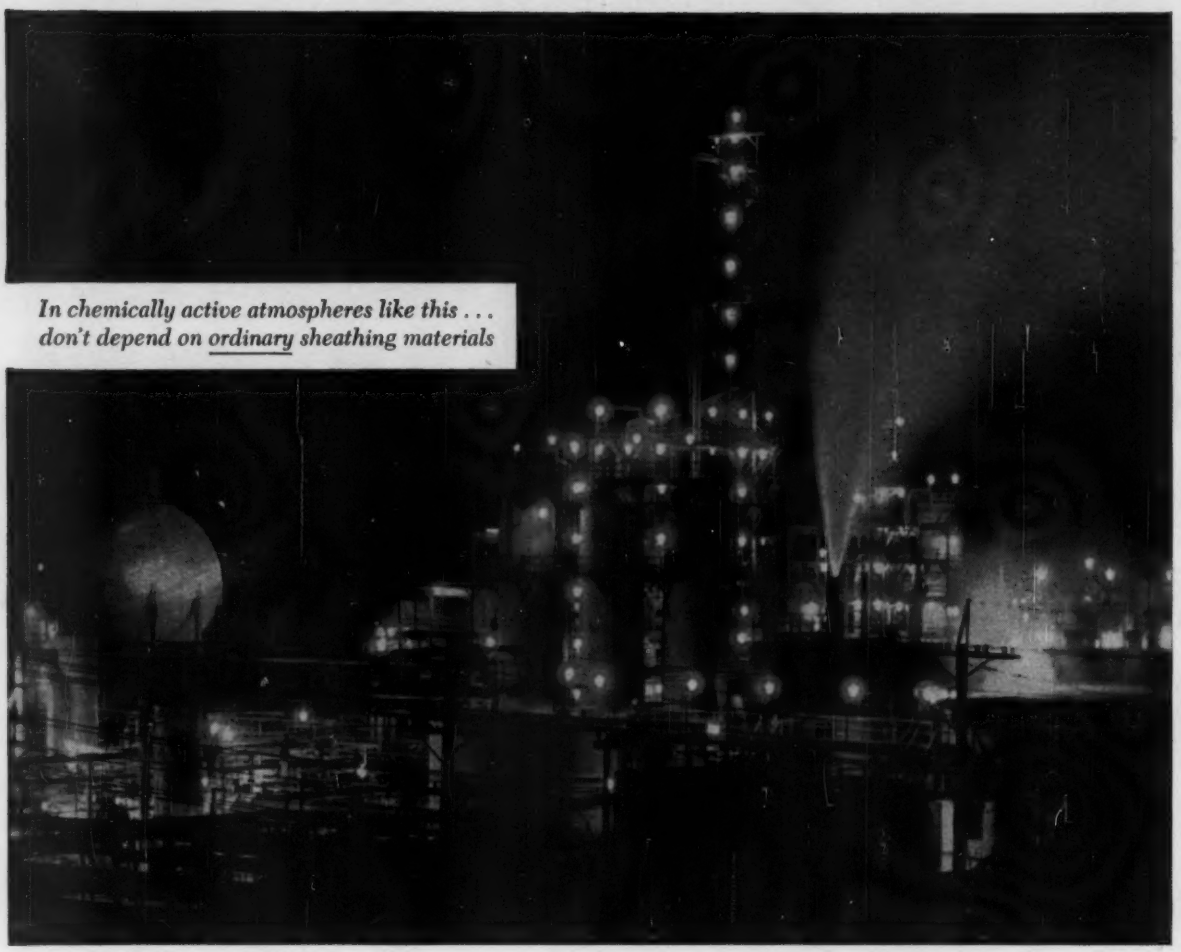




Solder-sealed bushings assure hermetic seal. Complete freedom from leaks or contamination of dielectric is assured. Wet-process porcelain bushings give maximum strength and excellent insulation value.

Zinc spray finish guarantees maximum protection. A lifetime corrosion-resistant coat of metallic zinc, sprayed on to a minimum thickness of eight mils, insures unparalleled case life under the most adverse conditions.

YOU CAN BE SURE...IF IT'S Westinghouse



In chemically active atmospheres like this . . . don't depend on ordinary sheathing materials

Continuity of power service often demands corrosion-resistant cable sheaths . . . like Roseal

What happens when your power cable in a refinery, steel mill, paper mill, or chemical processing plant fails from the deterioration caused by a highly corrosive atmosphere? You pay to replace the cable, your customer complains about downtime, and most important—*you lose power revenue.*

Now you can avoid power service interruptions in areas like those where the increased likelihood of cable breakdown presents a real problem. A new flame-retardant polyethylene compound—developed by Rome Cable—provides the kind of protective sheath you need in critical areas with oxidizing and corrosive atmospheres.

Tough new sheath

Called *Roseal,* this new sheathing compound makes long, uninterrupted service possible where heat, oils, acids, most chemicals, moisture, and oxidizing and corrosive atmospheres exist. Here's why:

1. Roseal resists oils, moisture, and most chemicals *even better than conventional nonmetallic sheathed cables.*
2. Its moisture-resistant characteristics are superior *to all other types of nonmetallic sheaths.*
3. Its flame retardance meets U/L original horizontal flame-test requirements.

Low-cost dependability

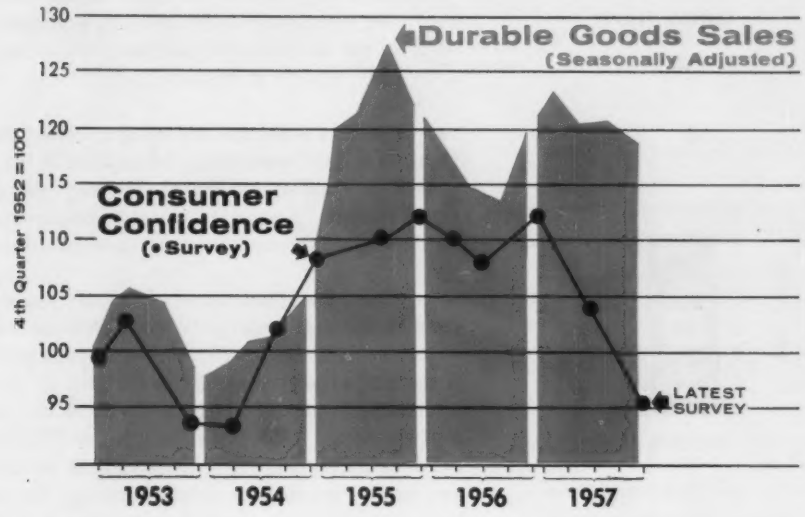
As an added benefit, in addition to its excellent properties, Rome's Roseal generally costs less than thermosetting sheaths. Roseal-sheathed cables are available with either aluminum or copper conductors and many types of insulations, including Rome's ozone-resistant oil-base (Rozone) or butyl-base (Rozone A) insulations. You can get single-conductor Roseal-sheathed cables in a variety of sizes from No. 8 AWG to 1,000 MCM, with grounded or ungrounded neutral, in standard voltage ranges from 3 to 15 KV.

For more information, contact your nearest Rome Cable representative—or write to Department 718, Rome Cable Corporation, Rome, New York.

FREE: New Technical Bulletin—describing in detail Rome's shielded high-voltage power cables—sheathed with thermoplastic Roseal—is now available. Just write for Bulletin RCD-700.

ROME CABLE
CORPORATION

The Electrical Business Outlook



Prospects for quick rebound in durable sales fade as . . .

Consumers Get a Case of Jitters

U. S. consumers just aren't in a buying mood right now. They're irked at higher prices, worried about their personal finances, and quite aware that the overall economy has taken a turn for the worse. Those are the somewhat pessimistic conclusions you have to draw from the University of Michigan's latest survey on consumer buying intentions and attitudes.

The slump in consumer confidence has been pretty drastic in the last six months or so. You see that clearly in the composite index of consumer attitudes (see chart above) which is based on intentions to buy houses and cars, plus six other yardsticks of consumer attitudes towards their own financial situation and general business conditions. The latest survey, taken in December, puts the index at a dismal 95—off almost ten points from last June's survey and down to the level of consumer confidence (or lack of it) at the beginning of the 1953-1954 recession.

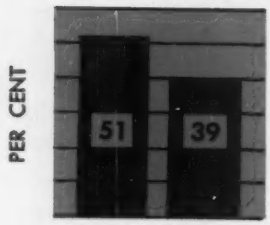
In detail, here are the latest findings of the Michigan Research Center:

● **Not many people think it's a "good time to buy"**—either new or used cars, houses or household appliances. Over the past year, the percentage of consumers with favorable buying intentions for durable goods has dropped from 51% to 39%. The number of people who think it's a bad or very bad time to buy household goods increased from 17% to 27%. And for the first time since 1953, less than half the people interviewed thought it was a good time to buy a car. Asked why, most people argued that "times are too uncertain" or that "people can't afford to buy these days."

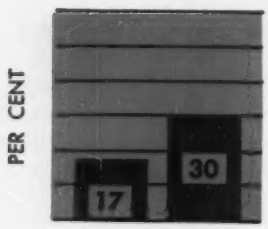
● **A growing number of consumers feel worse off financially** compared to a year ago. At the end of 1956 only 17% thought that their financial situation had deterioriated within the year. In the latest survey some 30% thought so, and only

28% thought that they were better off. This was the first time since the surveys were started in 1952 that the number of "worse off" answers actually outnumbered the "better off" replies.

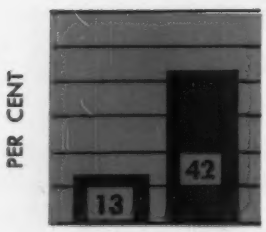
How many consumers think . . .



". . . . It is a good time to buy large household items."



". . . . they are worse off financially than a year ago."



". . . . business conditions are worse than a year ago."

• **Concern over general business conditions is even more pronounced.** The question was: "Would you say that at present business conditions are better or worse than they were a year ago?" Some 40% of the families in the survey said they were worse; only 14% said they were better. Asked about future conditions, 62% of the consumers expect business to be about the same a year from now. Only 16% thought it would get better.

• **Recession is not the only thing worrying consumers.** Complaints about prices being "too high" were pretty widespread in the latest batch of interviews. Almost half of the families questioned said they had personally felt the impact of higher prices recently. Some 43% expected continuing price increases in 1958, and one-third thought that the trend would continue over the next five years.

As a whole, the Michigan survey hardly paints a rosy consumer picture. And in the past, the data from the Survey Center have been a good indicator of consumer buying in the immediate future—particularly for durable goods. Most important is that the surveys generally call a turn in the direction of durable sales ahead of changes in personal income. In 1954, the overall index of consumer attitudes anticipated the 1955 boom long before incomes started to rise. And in 1957, the June survey showed a weakening in consumer confidence although incomes and durable goods sales were still rising. The latest survey underscores this shift towards uncertainty—and gives no sign of a pick-up in durable sales.

Of course, the big question still remains: "Have we reached the low point of consumer confidence or will it sag further?" Actually the latest survey was so timed (i.e. late 1957) that any optimism on the part of consumers would have been pretty surprising. Personal income was declining for the first time in a long while and unemployment was much higher than usual. For the 4th quarter of 1957, consumer expenditures were already off some $1.1 billion—for the first time since late 1953.

And the Michigan experts are careful to make these points about the latest case of consumer jitters: (1) For the longer run, the optimists still outnumber the pessimists by almost three to one, indicating that the average consumer is best described as "cautious" rather than really scared. (2) Even with its recent nose-dive, the index of consumer attitudes is still higher than it was in late 1953. And the 1954 recession didn't bring much of a decline in consumer spending. (3) Most of the current pessimism tends to be over national business trends rather than personal finances. Despite their worries, a third of the families in the recent survey reported a gain in income over a year ago, while less than a fourth reported declines.

On specific products, the survey charts only the general trend. Plans to buy new cars are somewhat below either late 1955 or 1956 and way below the pre-boom level of three years ago. And most people think that times are "too uncertain" to buy a new home. Plans to buy household appliances showed no decline over the past year. But that's hardly much consolation since consumer intentions in this area had already slumped significantly.

It seems clear the consumer isn't going to pick up much of the slack in the economy—at least over the short run. Some of the gloomy sentiment from business circles has definitely spread into the consumer sector. And most families are well enough stocked with durable goods to stay out of the market for a considerable time—or at least until they start feeling more confident about the future course of business.

The Electrical Manufacturers Outlook

Business Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
ndexes: 1947–49 = 100					
FRB Industrial Production	Nov.	141	145	147	−4.1
ENR Construction Cost	Jan.	155.9	154.7	148.4	5.1
BLS Cost-of-living	Nov.	121.6	121.1	117.8	3.2
New Orders for Machinery (1950 = 100)	Dec.	128	119	138	−7.2
NEMA Sales					
Insulation materials	Nov.	123	133	149	−17.4
Electric appliances		74	88	81	−8.6
Wholesale prices					
Motors and generators	Nov.	143.0	143.0	140.1	2.1
Transformers and regulators		150.8	150.8	146.6	2.9
Switchgear and fuses		171.2	170.9	164.4	4.1
GNP—annual rate—$ billion	3rd Qtr.	439.0	434.3	416.7	5.4

1958: Less Gloom but No Boom

A better year than 1957, but not up to '55 or '56—that's the Commerce Department's view of electrical equipment makers' 1958 prospects. The department's Electrical Equipment Division cites population growth, fast-spreading electric service, and easy money as prime movers that will pull this year ahead of 1957.

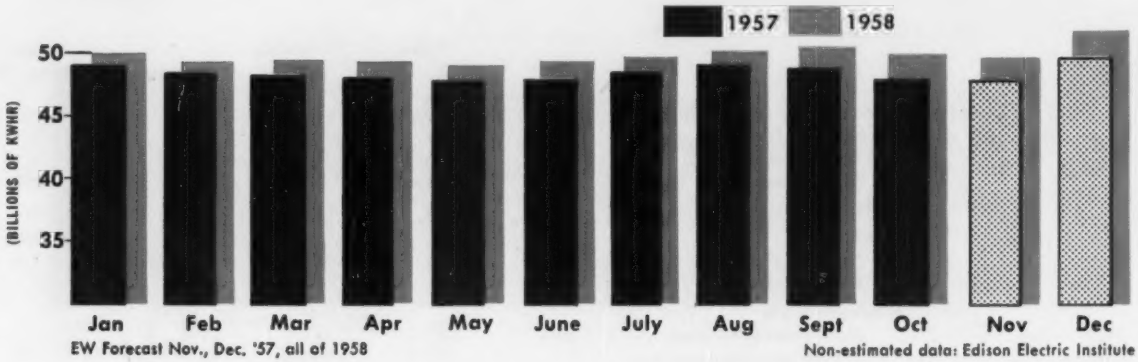
The department anticipates an upswing in new orders—but not before the second quarter—and warns that second- and third-quarter shipments may "fall drastically in some areas."

Here are the department's reports on four major subdivisions of the industry.

- **Outlook is bright for the interior distribution equipment industry.** New home starts are expected to run above the million mark. A busy schedule of school construction and rising capital outlays of electric utilities will also push up sales.
- **"Uneasy" is word for high-voltage transmission and distribution equipment** during the first nine months of '58, but the department sees possible heavy production in the last quarter extending into 1959. Orders for small power and distribution transformers have slowed. While the department sees orders for transformers of over 10 Mva holding stable, they point out that imports are accounting for a major percentage of federal government purchases.
- **Production of motors and controls should be about 3% above 1957.** Department draws this conclusion from the continuing move to automation in industry.
- **The lighting equipment industry is in for a 9.5% gain over 1957.** One reason is the expected building pick-up; another is the improvement of lighting standards in schools, stores, and factories. By 1965, annual industrial lighting equipment sales should hit about $140 million—doubling 1955 sales. The highway program will add to the market, as will the appearance of more shopping centers with illuminated parking lots and heavy display lighting.

The Electric Utility Outlook

Sales Forecast . . .



EW Forecast Nov., Dec. '57, all of 1958

Non-estimated data: Edison Electric Institute

Utility Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Sept.	126.24	125.75	118.66	6.4
Peak—Class I Systems (million kw.)	June	104.6	97.8	97.2	7.6
Estimated Dec. '57 Peak (million kw.)	Oct.	112.7	112.8	114.8	−1.8
Production—billion kwhr	Oct.	53.16	51.57	51.13	4.0
Hydro		10.04	9.28	9.24	8.7
Fuel		43.12	42.29	41.89	2.9
Sales—billion kwhr	Oct.	47.62	49.01	46.01	3.5
Residential		12.19	12.86	11.26	8.3
Commercial		7.86	8.59	7.34	7.1
Industrial		24.99	24.76	24.86	0.5
Other		2.58	2.80	2.55	1.2
Fuel Consumption	Oct.				
Coal—million tons		13.82	12.75	13.54	2.1
Oil—million barrels		6.42	5.64	6.28	2.2
Gas—billion cu ft		111.80	137.60	113.81	−1.8
Net Income Class A & B Co's—$ million	Nov.	113.84	101.87	103.39	10.1
Residential Customers—millions	12 mos.	46.69	46.61	45.49	2.6
Revenue per kwhr	ended	2.56¢	2.57¢	2.60¢	−1.5
Avg kwhr per customer	Oct. 31	3,135	3,121	2,941	6.6
Avg annual bill		$80.26	$80.21	$76.47	5.0
Moody's Averages					
Public Utility Bond Yields	Jan.				
Aaa		3.68	3.93	3.81	−3.4
Aa		3.73	4.05	3.87	−3.6
A		3.93	4.58	3.96	−0.8
Baa		4.60	4.81	4.26	8.0
24 Utility Stocks					
Price	Jan.	$53.04	$50.30	$50.05	5.9
Earnings (latest qtr)	Sept.	3.35	3.31	3.35	...
Dividends (annual rate)	Jan.	2.46	2.46	2.40	2.5
Yield (%)	Jan.	4.64	4.89	4.80	−3.3

The Meetings Calendar

FEBRUARY

Edison Electric Institute—Commercial Cooking & Water Heating Committee, Washington, D. C., Feb. 17-18; Meter & Service Committee, Sheraton Hotel, Philadelphia, Pa., Feb. 17-19.

Pennsylvania Electric Association—System Planning and Transmission & Distribution Committees joint meeting, Penn-Sheraton Hotel, Pittsburgh, Pa., Feb. 20-21; Electrical Equipment Committee Winter Meeting, Hotel Roosevelt, Pittsburgh, Pa., Feb. 27-28.

National Wiring Sales Conference — Statler Hotel, Detroit, Michigan, Feb. 20-21.

MARCH

Southern Safety Conference, Inc.—Exposition, Peabody Hotel, Memphis, Tenn., March 2-4.

Right of Way Meeting — Electrical World's second conference on R/W practices, procedures, and problems, Conrad Hilton Hotel, Chicago, Ill., March 6-7.

Pacific Coast Electrical Association — Business Development Section, Statler Hotel, Los Angeles, Calif., March 6-7; Engineering & Operation Section, Sheraton Palace, San Francisco, Calif., March 27-28.

Lighting Lamps and Electrical Manufacturers Salesmen's Association—First National Lighting Exposition, Coliseum, New York City, March 9-12.

Public Utilities Advertising Association—Regional Meeting, Montreal, Canada, March 13-14.

Nuclear Congress—Co-sponsored by American Society of Mechanical Engineers and the Engineers Joint Council, International Amphitheater, Chicago, Ill., March 16-22.

Interstate Power Club — Hotel Martinique, New York City, March 17.

National Association of Corrosion Engineers—Annual Conference & Exhibition, Municipal Auditorium, San Francisco, Calif., March 17-21.

American Institute of Electrical Engineers and American Society of Mechanical Engineers—Joint Management Conference Committee, Hotel Somerset, Boston, Mass., March 19-20.

Edison Electric Institute — Industrial Relations Committee, Headquarters, New York City, March 20; Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., March 24-27

Institute of Radio Engineers—National Convention, Waldorf-Astoria Hotel and New York Coliseum, New York City, March 24-27.

Northwest Public Power Association — Engineering and Operations Section, Clark County PUD Electric Center, Vancouver, Wash., March 26-27.

American Power Conference—20th Anniversary Meeting, Sherman Hotel, Chicago, Ill., March 26-28.

Oklahoma Utilities Association — Annual Convention, Oklahoma Biltmore Hotel, Oklahoma City, Okla., March 27-28.

Electrical Maintenance Engineers Association of Southern California—Industrial Electric Show and Conference, Shrine Convention Hall, Los Angeles, Calif., March 27-29.

Southeastern Electric Exchange—Annual Meeting, Boca Raton Hotel and Club, Boca Raton, Fla., March 31-April 2.

APRIL

Rural Electrification Administration — 9th Annual Electric Generating Plant Operation and Maintenance Conference, Phoenix Hotel, Lexington, Ky., April 7-10.

Indiana Electric Association—Young Men's Utility Conference, Evansville, Ind., April 8-9.

Microwave Research Institute—Symposium on Electronic Waveguides held in cooperation with Institute of Radio Engineers, New York City, April 8-10.

Rocky Mountain Electric League — Spring Conference, Shirley-Savoy Hotel, Denver, Colo., April 13-15.

American Institute of Electrical Engineers—Rubber and Plastics Industries Subcommittee, Mayflower Hotel, Akron, Ohio, April 14-15.

• **Edison Electric Institute**—National Conference of Electric and Gas Utility Accountants, held jointly with AGA, Shamrock Hilton Hotel, Houston, Texas, April 14-16; Industrial Relations Committee, Headquarters, New York City, April 17; Accident Prevention Committee, Commodore Perry Hotel, Toledo, Ohio, April 27-30; Purchasing and Stores 1958 Annual Meeting, Hotel Nicollet, Minneapolis, Minn., April 28-30.

American Welding Society—Sixth Annual Welding Show, and Technical Meeting, Kiel Auditorium and Hotel Statler, St. Louis, Mo., April 14-18.

Agricultural and Mechanical College of Texas—11th Annual Conference for Protective Relay Engineers, College Station, Texas, April 14-16.

Northwest Public Power Association, Inc.—Annual Membership Meeting, Ridpath Hotel, Spokane, Wash., April 16-18.

Missouri Valley Electric Association—Engineering Conference, President Hotel & Municipal Auditorium, Kansas City, Mo., April 16-18.

• **Pennsylvania Electric Association**—Meter Committee, Galen Hall Hotel, Wernersville, Pa., April 24-25.

• **Northwest Electric Light & Power Association**—Engineering & Operating Section, combined with Personnel & Safety Sections and Purchasing Committee, Chinook Hotel, Yakima, Washington, April 23-24.

• **Pacific Coast Electrical Association**—Administrative Services Section, Valley Ho Hotel, Scottsdale, Ariz., April 23-24.

• Additions this week.

MORE BIG DATES FOR '58

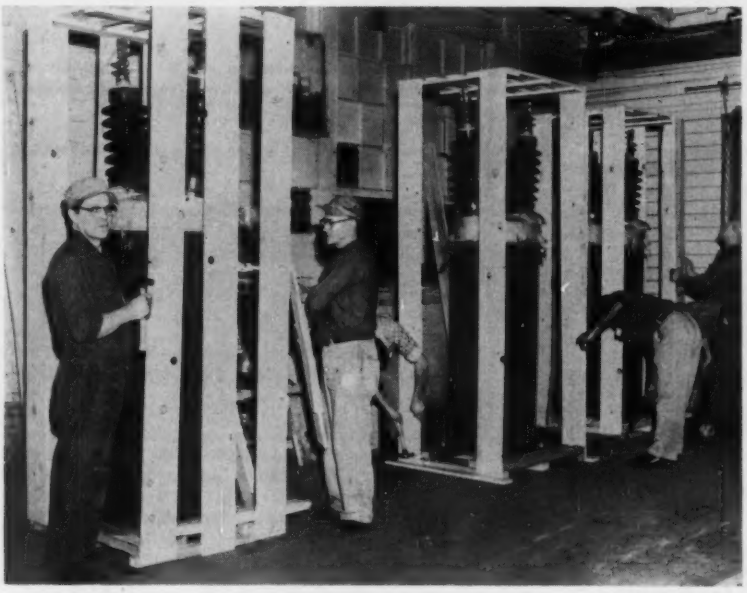
American Public Power Association—Annual Meeting, New Orleans, May 6-8.

National Association of Purchasing Agents — Annual Convention, Chicago, May 11-14.

Edison Electric Institute—26th Annual Convention, Boston, June 9-12.

American Institute of Electrical Engineers — Summer General Meeting, Buffalo, June 22-27.

National Electrical Manufacturers Association—Annual Meeting, Atlantic City, Nov. 10-14.



R&IE Readies 46-Kv, 2-Cy Reclosers

First 46-kv automatic circuit reclosers to come off the production line at the R&IE Equipment Division, I-T-E Circuit Breaker Co, Greensburg, Pa., are shown being crated for shipment. These reclosers are rated 140-amp at 46 kv.

Reported to be the largest units with self-contained reclosing mechanisms built to date, these two-cycle instantaneous tripping reclosers have interrupting ratings of 3000-amp rms symmetrical for 46 kv. This type is also built for 34.5-kv service with a 4000-amp interrupting rating.

Westinghouse Reports on Developments

Westinghouse Electric Corp, Pittsburgh, Pa., announces the following four developments:

• Tape bonds and impregnating resins containing epoxy-like molecular linkages, coupled with basic Thermalastic insulation, are being used on large turbine-generator stator windings. This insulation is a combination of mica splittings, thin glass fabric, and high thermal endurance resins.

These improved resins have been used in stator coil insulation for all windings since 1955. They raised the permissible temperature for equal life by more than 20C. This improvement clearly placed the temperature classification and thermal endurance limitations on the cellulose backing for the mica tape.

• Dry-type distribution transformers with breakers mounted on the side are now available in 300 kva ratings and below. This design reduces space requirements and installation costs, and eliminates conduit run and condulet fittings associated with remote mountings of the breakers.

• A large "diorama" featuring three kinds of lighting, installed recently in Pennsylvania Station, New York, includes fluorescent lamps with new Ultralume phosphors, Beauty Tone incandescent lamps, and Rayescent lamps. The latter are electro-luminescent panels made of glass having a special conductive coating with a phosphor layer. When power is applied the phosphors produce light.

• The first gas turbine power station with automatic remote controls will be built for Compania Shell de Venezuela. A 10,000 kw station, it will power a new $85-million oil storage and tanker-loading facility on Lake Maracaibo.

Mechanical Trailer Kit Developed by Tel-E-Lect

A mechanical trailer kit has been developed to handle large reels of cable. It is manufactured by Tel-E-Lect Products, Inc, Minneapolis.

The unit is designed to convert trailer chassis for powered loading and unloading operations. It employs winch power for cable reels up to 90 in. diam, has a rated capacity of 5 tons and is an aid in modernizing old trailers.

GE Produces 600-lb CT

A 15-kv compound-filled instrument current transformer weighing 600 lb, with a ratio of 8,000:5 amp, has just been built at General Electric Co's West Lynn, Mass., Instrument Dept. Its 16½-in. window will accommodate an 11x11-in. bus bar. The company is building six of these transformers for the Listerhill, Ala., project of Reynolds Metals Co. They will become part of the protective equipment between TVA and Reynolds' aluminum plant. Largest transformer of this type previously build by GE weighed 160 lb.

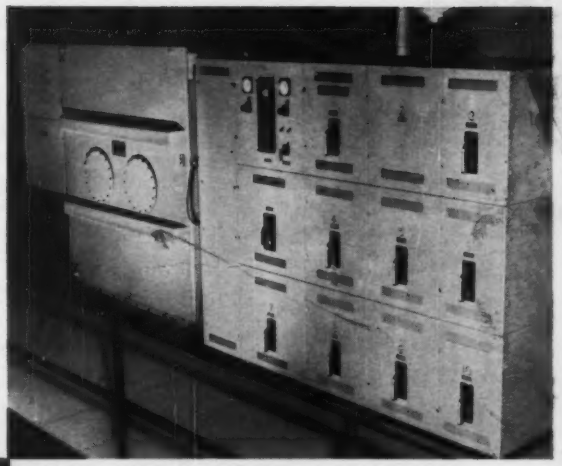
CTI Elects Officers

The Cooling Tower Institute, Palo Alto, Calif., has elected the following officers for 1958: President, Karl E. Johnson, vice president and general manager of J. F. Pritchard & Co of California; Vice President,

(*Continued on page* 114)

Schlitz

adds power capacity ...modernizes distribution system with WAGNER TRANSFORMERS



This is one of the Wagner-equipped unit substations that modernize power distribution at Schlitz. The Wagner Sealed Dry-Type Transformer is rated 1000 kva.

Jos. Schlitz Brewing Company, Milwaukee, Wisconsin.

A continuing program of modernization is one of many reasons why the Jos. Schlitz Brewing Company is a leader in industry. Plant power distribution, for example, has been modernized and expanded to assure an uninterrupted flow of electric power for production of "The Beer That Made Milwaukee Famous."

Schlitz chose Wagner Sealed Dry-Type Transformers for their power distribution load centers. These modern unit substation transformers can be safely installed in any load center—any place—because they are hermetically sealed in welded steel cases to provide positive protection from contamination, fire and explosion hazards. The only maintenance they require is a periodic checking of gas pressure (inert nitrogen), case and bushings.

Wagner Sealed Dry-Type Transformers can serve your power needs just as they do at Schlitz. They are "Predesigned"—coordinated with the specifications of unit substation builders to save job engineering, time, and money. Consult the nearest of our 32 branch offices, or write for Bulletin TU-214 for full information.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

...to help America LIVE BETTER—*Electrically*

LIVE BETTER ELECTRICALLY

Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

WT58-9

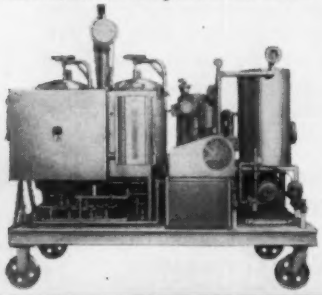
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

CFC PURIVAC means SAFETY in Oil Reconditioning

The CFC Purivac filters, dehydrates and degasifies insulating oil in one *safe* operation. Purivac is safe for the operator — the apparatus — and the oil. No other reconditioning system offers all these safety features:

- centralized control panel
- automatic temperature control
- automatic liquid level controls
- automatic vacuum controls
- relief valves on all pumps
- all pump drives guarded
- drip-proof switches
- oil-proof wiring
- low-watt density heaters
- insulated hot oil vessels
- sampling cocks to check oil
- low oil temperature requirements

Installations in leading utilities throughout the country have proved that CFC Purivac is safe—economical—effective in restoring oil to "like-new" condition. Write for technical literature to Department EW.



COMMERCIAL FILTERS CORPORATION
Melrose 76, Massachusetts
Plants in Melrose, Mass. and Lebanon, Ind

Denis E. O'Neil, manager, cooling power dept, Foster Wheeler Corp, San Mateo, Calif.; Secretary, Forrest B. Reed, vice president and sales manager, The Marley Co, Kansas City, Mo.; and Treasurer, Ennis C. Smith, manager, cooling equipment division, Hudson Engineering Corp, Houston, Tex. Raymond C. Kelly continues as executive manager.

Chance Co Films Show Use of Hot-Line Tools

A series of nine films depicting step-by-step procedures for handling hot-line tools is now available for use in training and educational programs.

The 16-mm, color-sound films show how hot-line tools are used to change insulators, crossarms, and poles on high-voltage lines. A. B. Chance Co, Centralia, Mo., will make these films available for group presentation without charge.

Here are the numbers, titles, and running times of the films:

No. 4—Hot Sticks on 34.5 Kv; 45 min

No. 8—Hot Sticks on Rural Lines; 45 min

No. 9—Hot Sticks on 69 Kv; 45 min

No. 10—Hot Sticks on 161 Kv; 45 min

No. 11—Hot Sticks on 69-Kv Towers; 45 min

No. 12—Splicing ACSR Conductors "Hot"; 10 min

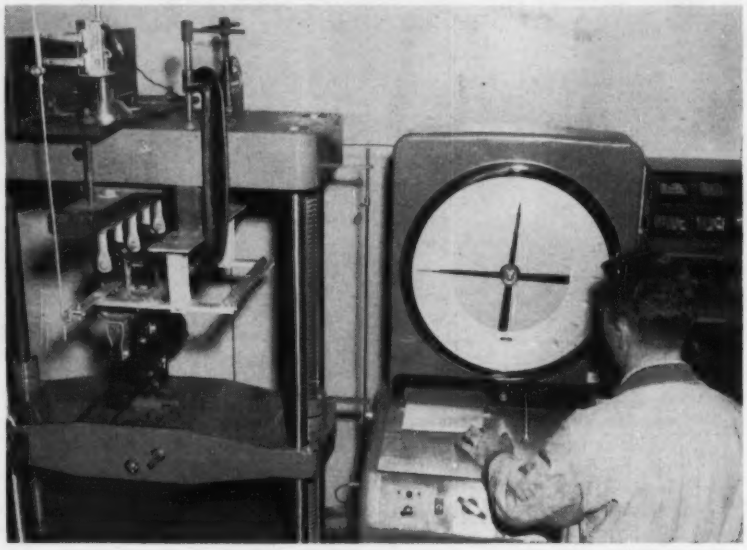
No. 13—Twin String Deadend Insulator Change on 230-Kv Steel Tower Lines; 10 min

No. 14—Keeping 'Em Hot at 34.5 Kv; 25 min

No. 15—Making Good Connections; 20 min

90-Ton Furnace Installed

A copper-melting electric furnace, 18 ft in diam with three 18-in.-diam



L-M Installs Test for Pole Hardware

A recently acquired mechanical testing machine in the research laboratory of Line Material Industries, Milwaukee, features continuous recording of loading and deflection of test specimens. Data is obtained on pole-line hardware and other items. Direct recording provides increased test accuracy, reveals specimen pecularities, and doubles the testing rate. Cyclical loading charts are easily obtained.

The machine is shown stressing a three-spool secondary rack. Special jigs and yokes are used to help simulate in-service conditions and measure the desired deflections.

graphite electrodes and a bath capacity of 90 tons of molten metal, has gone into operation at the Perth Amboy, N. J., plant of American Smelting & Refining Co. The new furnace can continuously produce 30 tons of tough pitch copper per hour. Its transformer is rated 8,000 kva, with a maximum rated current of 30,400 amp. Whiting Corp, Harvey, Ill., produced the furnace. General Electric made the transformer and controls.

Asplundh Marks 30 years

Asplundh Tree Expert Co, Jenkintown, Pa., was founded 30 years ago. To mark this anniversary the company has issued a 30-page brochure, entitled, "The Long Look Ahead at Line Clearance." This publication, in color and well illustrated, presents the company's activities and facilities.

NYSPA Opened Bids on 130-Mva Transformers

The New York State Power Authority recently opened bids for the design, manufacture and furnishing of three, 130-Mva, two-winding power transformers and associated equipment for the Reynolds Substation of the St. Lawrence Power Project.

Apparent low bidder was the English Electric Export and Trading Co, Ltd, New York, which quoted $708,600. Other bidders were: General Electric Co, New York, $824,957; Pennsylvania Transformer Co, Division of McGraw Edison Co, New York, $857,445; Maloney Electric Co, New York, $957,950; and Allis-Chalmers Manufacturing Co, New York, $1,002,520. Bids are being analyzed by Power Authority engineers.

Bakelite Foam Insulation

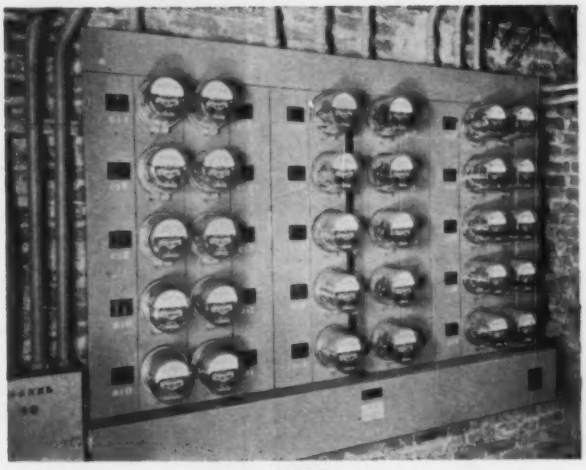
Bakelite Co, New York, reports phenolic foam insulation protects utility service inlets from weather damage while significantly reducing material and labor costs.

(*More M&M on page* 116)

ANCHOR

FOR DESIGNERS OF OFFICE BUILDINGS APARTMENT HOUSES

BEFORE



AFTER

The above are actual photographs of part of a Meter Room which was recently modernized by installing Anchor meter channels. These combine the meter mountings and main breakers for each apartment in one factory wired compact assembly.

Bulletins on request

ANCHOR MANUFACTURING CO.
MANCHESTER, NEW HAMPSHIRE

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

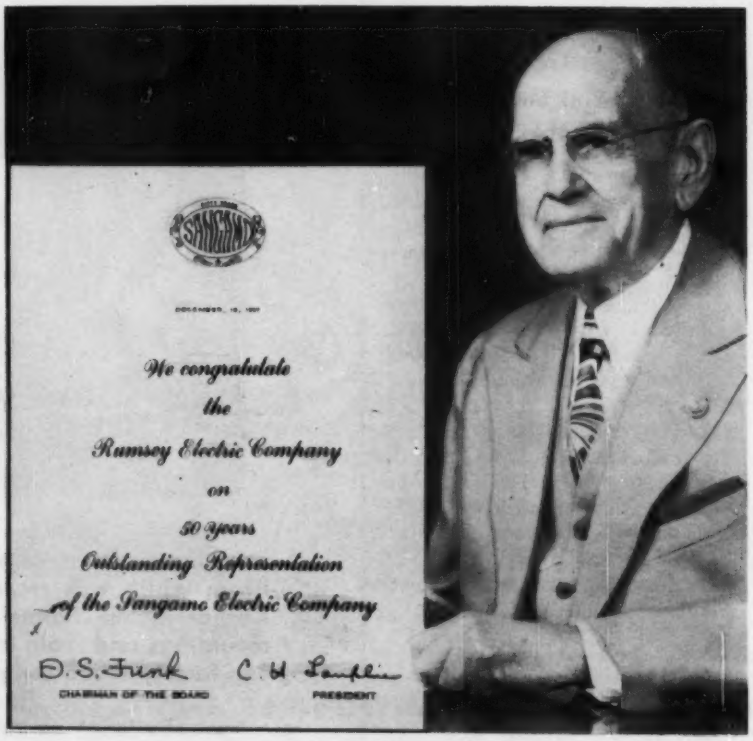
INDIANA
STEEL & WIRE CO., INC., Muncie, Indiana

Stator Electric Co, Woodside, N. Y., has been able to cut its motor rejection rate from 20% to almost zero by the use of a silicone-based hand cream. This Silicare is a product formulated with Dow Corning Silicones by Revlon, Inc. Motor winders were relieved of an industrial skin rash which contaminated the motor insulation.

Englehard Industries, Inc, Newark N. J. is formed by the consolidation of nine American companies in the precious metals and precision manufacturing fields. Included are: H. A. Wilson Co, producer of electrical contacts and thermostatic materials; Baker & Co, refiner of precious metals; and D. E. Makepeace Co, producer of atomic-reactor components. Englehard controls three other domestic companies and 12 foreign corporations.

Harvey Aluminum is the new corporate name for Harvey Machine Co. The change was made because of the company's expansion in the aluminum industry, Lawrence A. Harvey, exec. vice president, said.

Transformer and Switchgear, Ltd, a recently formed $525,000 company in Madras, India, has started production of transformers up to 500 kva for voltages up to 33,000 v; plans to expand for 5,000 kva transformers.



Sangamo Honors Rumsey with Citation

George A. Rumsey, chairman of the board of Rumsey Electric Co, Philadelphia, Pa., received a Gold Card as a 50-year service award from the Sangamo Electric Co, Springfield, Ill. Rumsey Electric was honored for "50 years of outstanding representation" as a Sangamo distributor. The Rumsey firm became associated with Sangamo in 1907.

NEW LITERATURE

• **CABLE SPECIFICATIONS:** An edition of "Specifications for Municipal Communications Control, Signal, and Power Cables" has been published by Kaiser Aluminum & Chemical Sales, Inc. The 208-p "Red Book" includes 15 proposed specifications as well as 32 approved by the International Municipal Signal Association. It may be obtained free from R. H. Turner, Electrical Conductor Div, Kaiser Aluminum & Sales, Inc, 919 N. Michigan Ave, Chicago, Ill.

• **HYGROMETRY:** National Bureau Standards Circular 586 (21 pages) reviews the field of electric hygrometry—determining moisture content of a gas by measuring electrical resistance of a hygroscopic material with a change in humidity. "Electric Hygrometers" is the title. Order from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. ($0.20)

• **MICRORADIOGRAPHY:** Instruments Div, Philips Electronics, Inc, published a 48-p book, "Principles of Microradiography," which includes a bibliography of nearly 500 references prepared by Eastman Kodak Research Laboratories. It is available free from the publisher, 750 S. Fulton Ave, Mount Vernon, New York.

• **ADJUSTABLE SPEED DRIVE:** The Louis Allis Co has published a 12-p bulletin on the "Select-A-Speed", a variable-voltage dc drive (5 to 200 hp) that uses an ac power source.

• **MILL REGULATOR:** A 6-p folder from Reliance Electric & Engineering Co describes a dual-circuit mill regulator which regulates line speed, voltage, and tension for continuous process industries.

• **DECORATIVE PLASTIC:** Lamicoid, a laminated plastic with laminations in contrasting colors, can be used for making permanent signs, nameplates, or diagrams. An 8-p bulletin from Mica Insulator Co explains how.

• **HEATING ELEMENTS:** Quartz infrared elements with peak emission at 2.3u are the subject of a 4-p bulletin from Quartz Products Corp.

• **MERCURY LUMINAIRE:** A 4-p bulletin from Revere Electric Mfg Co lists features and applications of a 4-lamp, outdoor, mercury luminaire for large area lighting.

• **POTHEADS:** Delta-Star Electric Div, H. K. Porter Co, Inc, has published a 12-p pothead catalog for 2.5- to 34.5-kv service, single- or three-conductor, 1/0 to 2,000,000 Mcm cable.

For further information write, New Literature Editor, Electrical World.

The design work on all these new substations is going to be hard to handle with our present force.

Of course! They have enough to do handling routine duties. Why don't you call in PIONEER?

GIVE YOUR NON-ROUTINE OPERATIONS TO PIONEER

Design and Consulting Engineering Services

Pioneer has specialized in designing power plants for 56 years. It offers design service for fossil fuel, hydro and atomic plants. It will also assist in forecasting load growth, in site selection, in purchasing and expediting of equipment and in supervising construction. Pioneer's other services include substation, transmission and distribution studies and design.

Services in Regulatory Matters

Pioneer offers its services in all phases of Federal, State and Local regulation including the rate base, depreciation analysis, cost of service studies, market analysis, certificate proceedings and rate of return.

Corporate Services

Pioneer's services in corporate matters include business and management engineering advice, financial, accounting and tax counsel and insurance and pension plans and programming. It maintains a complete stock transfer, ledger and dividend disbursement service.

NEW!
On your letterhead, write for 40-page booklet, "Pioneering New Horizons in Power". Describes, illustrates Pioneer's engineering services, and corporate services, from financing to operation.

56 YEARS

Pioneer Service & Engineering Co.

231 South La Salle Street
Chicago 4, Illinois

Chance Ups Isbell, Hansen to Key Sales Posts

J. T. ISBELL

Jackson T. Isbell and L. C. Hansen, sales executives with A. B. Chance Co, have been promoted to assistant to the president and vice president of marketing, respectively.

Isbell, in his new position, will handle special assignments for the firm's president, involving the Chance Co expansion program and the development of new markets. Isbell, vice president of sales since 1949, has held various sales posts since joining the firm in 1928.

Hansen, who comes to his new position from that of director of marketing, will now be responsible for administration of all phases of the Chance sales program. He is former sales manager of the company and became a board member in 1955.

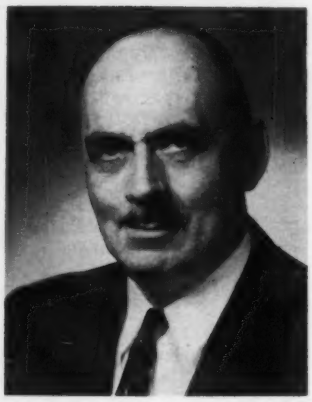
L. C. HANSEN

Sangamo Elects Kennedy VP

Sangamo International, Inc, has announced the recent appointment of W. A. Kennedy to the position of vice president and general manager of the corporation.

In this capacity, Kennedy will direct western hemisphere export sales of the corporation and of its U. S., Canadian, and British subsidiaries. They are Sangamo Electric Co (Springfield, Ill.), Sangamo Co, Ltd (Leaside, Ontario), and Sangamo Weston, Ltd (Enfield, England).

Kennedy, who will now make his headquarters in New York City, has been directing export sales for the Leaside component.



W. A. KENNEDY

AP&L Elevates Mary Nichols

First woman officer of Arkansas Power & Light Co is Miss Mary E. Nichols, who has been elected to the position of assistant secretary of the company.

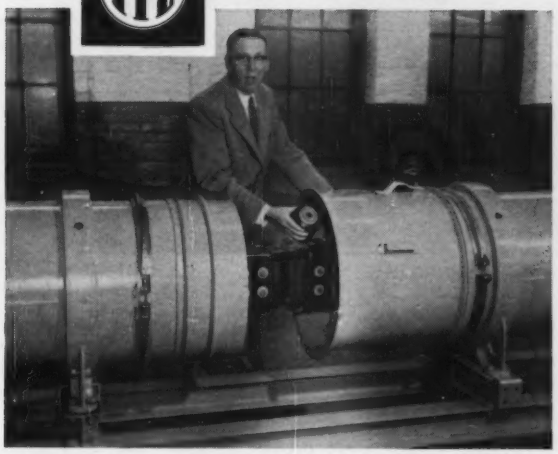
She assumes a post left vacant last year by the death of James L. Bodie, who was also treasurer.

Miss Nichols will continue as secretary to Pres R. E. Ritchie, a position she has held since 1948.

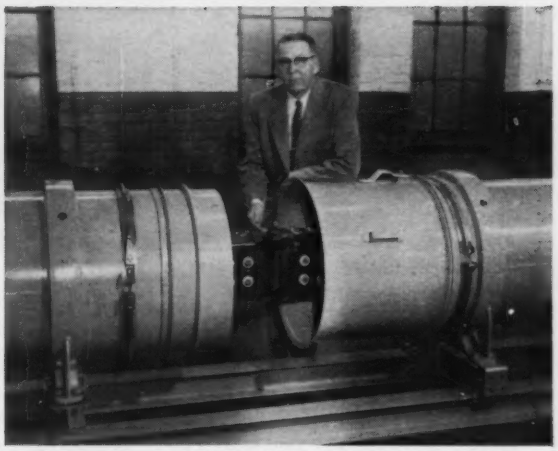
Since her first association with the company 31 years ago, when she joined as a temporary stenographer, Miss Nichols has held a number of positions in the treasury, accounting, and executive departments.

MISS M. E. NICHOLS

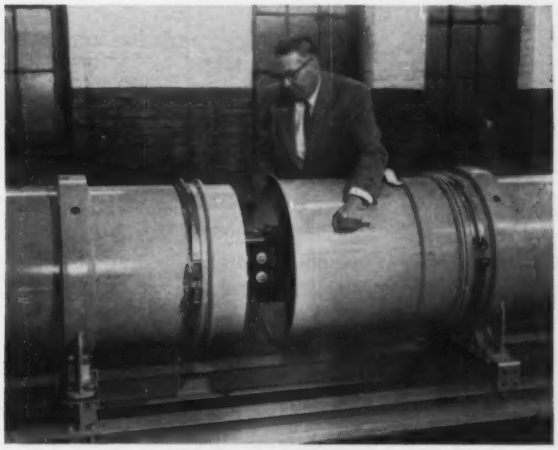
ISOLATED PHASE BUS



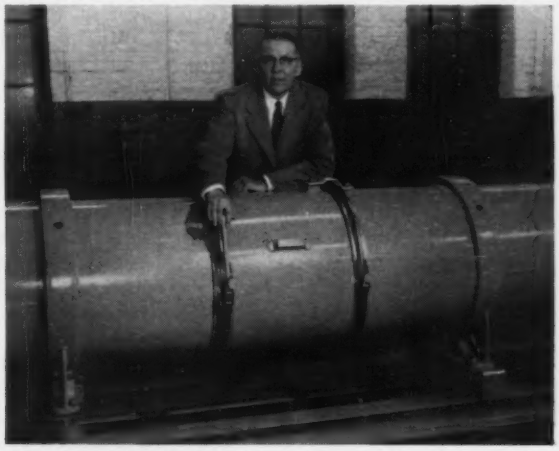
Sliding cover in open position. Connectors are easily accessible for assembly and maintenance. High-strength wet porcelain insulators, mounted in compression, are easily reached for inspection and removal.



Connectors can be either bolted or field welded. When bolted, Belleville washers are used to maintain adequate contact pressure. Conductors are either copper or aluminum. All copper connections are silver plated.



Sliding cover in partially closed position. Flanged cover, flanged rings, lifetime silicone rubber gaskets and clamping bands provide a positive seal, prevent dust accumulation, simplify opening and closing.



Sliding cover in closed position. Closure requires only two 1-piece lifetime silicone rubber gaskets—easy to place and remove. Simple, powerful V-clamp band exerts pressure uniformly around the flanged rings.

How I-T-E Sliding Covers Reduce Installation and Inspection Time

Sliding covers, well located, to facilitate joint makeup and inspection are one of the many money-saving advantages of I-T-E Isolated Phase Bus. Others include the most simple and efficient of designs; greatest installation flexibility; light weight to save installation time, labor cost, and structural steel; quick, reliable engineering; and excellent delivery.

I-T-E Isolated Phase Bus is available in ratings through 138 kv, through 20,000 amp. Self and forced-air cooled. Send today for Bulletins 10004-A and 10004-B, giving complete information. I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada: Eastern Power Devices Ltd., Toronto, Ontario.

I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA

K. G. KEMPF | H. C. MOSES, JR | C. A. BIDDULPH | C. A. BADEAU

Four VP's are Named at Thomas & Betts

Four new vice presidents of Thomas & Betts Co are Karl G. Kempf; H. Chester Moses, Jr; C. A. Biddulph; and Carroll A. Badeau.

Kempf, who becomes vice president in charge of the Sta-Kon Division, has been manager of the company's Pacific Coast Division for the three years before this assignment.

Moses, as vice president, now assumes responsibility for the Western and the Pacific Coast Divisions. He has been Western Division manager since 1955.

Biddulph, who rises to vice president in charge of the Eastern Division, most recently served as New York district manager and as Eastern Division manager.

Badeau was named administrative vice president and chief engineer. During his 23-year career with T&B, he has also been executive engineer and chief engineer.

PERSONAL BRIEFS

J. Harris Ward, Commonwealth Edison Co's executive vice president, took over the duties of **Herbert P. Sedwick** upon the latter's recent retirement as president of the utility's Public Service Co Division.

At Long Island Lighting Co, **Crosby Brezee** has been made assistant to the vice president—gas and electric sales, and **Lewis S. Jackson** has advanced to general sales manager in charge of both gas and electric sales.

Edison Electric Institute recently appointed **Walter B. Gesell** as director of economics and statistics. He came to EEI from Oklahoma Gas & Electric last fall as economics director.

James E. Beck has been named lighting sales director for Pacific Power & Light Co . . . City Light of Seattle (Wash.) has appointed **Robert W. Stinson** as overhead system general supervisor.

Harvey M. Sutter is new assistant to **William A. Pearl,** administrator of Bonneville Power Administration . . . **Roger L. Conkling** recently left a similar BPA post to join H. Zinder & Associates, utility consulting firm.

Frank M. Tait has announced plans to retire as chairman of the Dayton Power & Light Co to devote more time to the Tait Foundation, which he founded in 1955 . . . Public Service Electric & Gas Co's **Lyle McDonald** retired as chairman of the board of directors on Feb. 1. **Francis A. Keane,** PSE&G vice president, was named VP-finance.

Ohio Edison Co's **Harry Hale** has been made superintendent of the Edgewater Plant . . . At Gulf States Utilities Co, **Ray S. Pace** has been appointed purchasing agent in Beaumont and **Alfred E. Gajeske** purchasing agent in Baton Rouge. In engineering promotions, **Paul A. Harrington** was named project engineer of GSU's system engineering dept, Beaumont; and **Norman R. Lee** became Lake Charles Division engineer.

In recent reorganization of Mississippi's Public Service Commission, **Norman A. Johnson, Jr,** was elected chairman and **W. E. Moore** was elected co-chairman . . . **James F. Lamb** has risen to chairman of the New Mexico State Corporation Commission for 1958.

R. A. Freeman is new president of Consumers Public Power District . . . The Electric Lines Club of New England recently elected as its president **Carroll A. Oliver,** manager of Taunton (Mass.) Electric Light Dept.

Arizona's reorganized Corporation Commission has elected **George F. Senner, Jr,** as chairman . . . **Leslie A. Brandt** and **Ralph L. Braucher,** both of Peoples Gas Light & Coke Co, have been elected to membership in Controllers Institute of America.

Argonne National Laboratory has named **Thomas H. McGreer** to the staff of its Particle Accelerator Division as an associate electrical engineer. **Dr Frank E. Myers** has joined Argonne as associate laboratory director. His former post as head of Lehigh University's dept of physics went to **Dr Raymond J. Emrich.**

Henry W. Smith has been appointed general manager of B. C. Engineering Co, Ltd. He succeeds **William G. Huber,** now special assistant to Pres **Thomas Ingledow** . . . At Ontario Hydro, **W. H. Edwards** was recently named manager of the commission's west central region.

How your truth dollars help keep the Reds in the red

• The truth dollars you give to Radio Free Europe help keep truth on the air behind the Iron Curtain.

And the truth is an enormously disruptive force to the Reds. For it keeps their captive people thinking . . . wondering . . . and less than completely dominated. The truth keeps needling the Reds. Breaks through their monopoly of lies. Keeps them unsure. Off balance. And thus the truth keeps up to forty fully armed Red divisions tied up policing Russia's satellite countries. Forty divisions, mind you, that might otherwise be put to more aggressive use elsewhere . . . and who knows where?

Your truth dollars keep the 29 super-powered transmitters of the Radio Free Europe network on the air . . . broadcasting the truth behind the Iron Curtain . . . every hour of every day.

Why *your* truth dollars?

Because Radio Free Europe is a private, non-profit organization supported by the voluntary contributions of American business and the American people. And *your* dollars are urgently needed to keep it on the air . . . to help operate its transmitters, pay for its equipment and supplies, and its scores of announcers and news analysts in 5 languages.

Help keep the Reds in the red. Send your truth dollars to Crusade for Freedom, care of your local postmaster.

FREEDOM IS NOT FREE!

Your Dollars Are Needed To Keep Radio Free Europe On The Air

SEND YOUR TRUTH DOLLARS TO

CRUSADE for FREEDOM

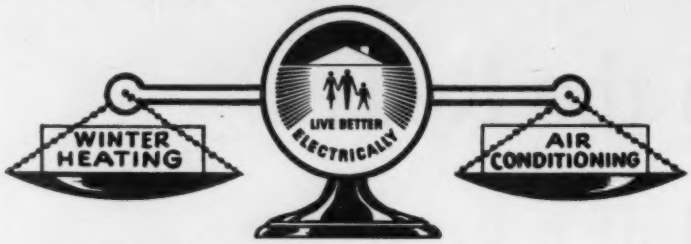
CARE OF YOUR LOCAL POSTMASTER

PUBLIC SERVICE ADVERTISING COUNCIL

BUILD YOUR WINTER LOAD with ELECTROMODE

ELECTROMODE All-Electric HEATERS

The perfect BALANCE for your Summer Air Conditioning Demands

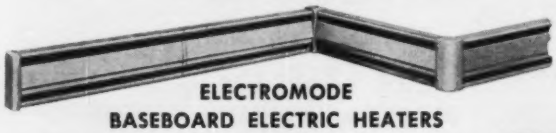


EVERYWHERE, *more and more people are* LIVING BETTER ELECTRICALLY

and Electromode is ready with the World's *Safest* and most complete line of All-Electric Heaters, to help utilities stabilize their loads on a year 'round basis.

More than 100 Models, specifically designed for the needs of

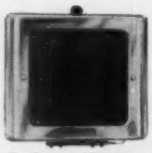
HOME • FARM • INDUSTRY



ELECTROMODE
BASEBOARD ELECTRIC HEATERS

WALL-TYPE FAN-CIRCULATING HEATERS

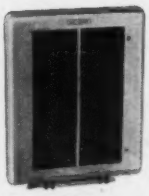
For All Size Rooms



Bathroom Heaters

Also made in Portable models, modern designs, and capacities for large and small rooms.

Other Electromode HOME Heaters: Radiant Cable Heat and Radiant Convection Panel Heaters



Down-Flo Heater for Big Rooms

Suspension-Type Heater

FOR INDUSTRY

Electromode Heaters are made in Suspension-Type, and Combination Portable and Suspension Heaters, as well as Explosion-Proof Heaters, specifically designed and approved for use in hazardous areas.

ALL AROUND THE FARM

Milk House Heater

Pump House Heater

Why Electromode is SAFEST!

because only Electromode has the Safety Grid, a completely sealed-in cast-aluminum heating element. No exposed hot wires or glowing coils. No danger of fire, shock or burn. Automatic safety switch prevents overheating.

ELECTROMODE
Division Of
COMMERCIAL CONTROLS CORPORATION

Get Complete Information From
Dept. EW-28 570 Culver Road
Rochester 3, New York

Personal Briefs

(*Continued from page* 120)

Winner of the 17th annual Laura McCall Award for home services is **Miss Margaret Buchan,** home service supervisor of Indiana & Michigan Electric Co's Fort Wayne Division.

Nova Scotia Light & Power Co, Ltd, has appointed **A. R. Harrington** as manager of the company and its subsidiaries.

New sales manager of Simplex Wire & Cable Co is **John M. Murray.** In the engineering dept, **N. D. Kenny** was made director of engineering.

J. Emmett Maider heads the newly combined marketing and project section of General Electric Co's atomic power equipment dept. **O. B. Falls, Jr,** was named a consultant to the department general manager . . . The metallurgical products dept has designated **Robert A. Slater** as manager of manufacturing engineering.

New chief engineer for Allis-Chalmers Manufacturing Co's control dept is **W. F. Eagan** . . . At the Terre Haute Works, **G. W. Lengnick** rose to supervisory engineer in charge of the transformer test dept . . . **Richard G. Goble** has been appointed assistant engineer in the mechanical components group, steam turbine dept.

The Pacific Coast region of Westinghouse Electric Corp has appointed **Steve C. Mulle** as manager of market planning . . . **John Burns** is new manager of facilities planning for the large and medium turbine dept, Steam Division . . . Westinghouse Supply has named **Harry A. Hillman** assistant to Pres **John Myers.**

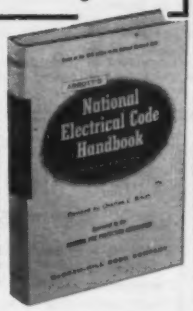
Dwight R. Anneaux has been appointed to the new post of general manager of the utility division at Whirlpool Corp. In addition, **C. R. Armstrong** was named general sales manager, electric utilities; and **John W. Benson** became advertising and promotion manager, utility division.

OBITUARY

William J. McIlvane, 62, former executive vice president of Copperweld Steel Co's Wire & Cable Division, died suddenly of a heart attack at his home in Annandale, Va.

How to
handle all types of
wiring and installation jobs

in strict accordance with the '56 National Electrical Code



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COMPANY STAFFS

General Electric Co's Assemblies and Components Sales organization has advanced Arthur E. Secker to district manager of the new Empire district and Robert A. Else to manager of the Seattle district . . . Walter E. Sutter is national manager of microwave sales for the communication products dept.

Ampere Industries has appointed the following representatives: Frank Seeley, for Hartford (Conn.); Lew Conover, for Philadelphia; Robert C. Ramsey, Oklahoma City (Okla.); Wayne C. Wells, Portland (Ore.); Cohn & Shane, Los Angeles; Leonard Vainik, Virginia (Minn.); Irving Gottlieb, Buffalo (N. Y.); and Harold Sudekum, Dallas.

Westinghouse Electric Corp recently named R. F. Castner assistant to C. V. Roseberry, VI-midwestern region. He's succeeded as Des Moines district manager by G. A. Corcoran. D. M. Bohrer becomes branch manager of the Davenport (Iowa) office.

Thomas & Betts Co has advanced Howard C. Johnson and Donald Frear to district managers in Los Angeles and San Francisco, respectively In addition, Billy R. Conner was made manager of the Florida district and James E. Williams manager of the new St. Louis district.

REPRESENTATIVES

Allis Chalmers Manufacturing Co's Industries Group has made the following appointments: Electric Supply & Equipment Co, Inc, Greensboro, N. C., was named an agency for feeder voltage regulators, power transformers, unit substations, switchgear, and circuit breakers; Sies Electric Supply Co, Chattanooga, Tenn., agent for regulators; and L. R. Reams Supply Co, Middlesboro, Ky., distributor for motors, control, and Texrope V-belt drive equipment.

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Continued from page 18

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A. D. Johnston, Reactor Engineer, checks parameter records. All photos courtesy of AEC.

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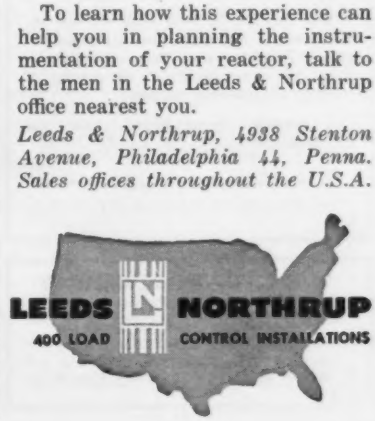

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Readers Forum

Perforations A Worry

To the Editor:

I realize that your recent practice of perforating the pages of Electrical World may be a useful thing to do for some individual subscribers. I want to point out to you, however, that this practice is a definite disservice to libraries which keep permanent files of your magazine. As you are no doubt aware, many libraries bind Electrical World. For example, our own library has a complete bound set from the very first issue. The perforated pages make it practically impossible to bind hereafter. The perforations are placed so that the margin inside is entirely too small for sewing. Of course, if the volume were sewed on the outside of the perforations it would defeat the purpose of the binding since eventually the pages would tear out at the perforations.

In view of this fact, would it be possible to have unperforated issues sent to libraries? The only other possibility that I can see is that at the end of the year you supply your library subscribers with bound volumes. I doubt, however, whether you would want to do that.

I believe you will receive letters from other librarians expressing the same opinion and hope that some way will be found to solve the problem. Your comments will be appreciated.

Samuel Sass, Librarian
The William Stanley Library
General Electric Co
Pittsfield, Massachusetts

We thank Mr Sass and others who have written us about problems anticipated in connection with the perforated pages. As was pointed out in the publisher's column (EW, Feb. 3), we have run a trial binding of our first perforated issues. Our book binder believes that bound volumes of the perforated issues will stand up well under normal treatment. If, after consulting with your binder, you still anticipate problems, please let us know.

"Understatement of Year"

To the Editor:

In your issue of January 20th, page 42, Mr. C. H. Whitmore commits the understatement of the year: "In the early 1930's it was the view of the federal administration that investor-owned systems had failed to give adequate service to farms . . ."

I suggest you keep right on disseminating such ridiculous statements. A few people will be fooled, but not many. Most people know it was not only "the view of the Administration" but the demonstrated fact admitted by the investor-owned systems themselves. Correction of that deficiency was and is necessary for the national security and well being. These facts cannot be truthfully controverted.

Wilbert L. Merriken
Attorney at Law
Denton, Md.

Coulee Outspins Russian Dam

To the Editor:

We have noted the article "Russian Steps Ahead of Coulee" appearing in the Dec. 2, 1957, issue of *Electrical World*.

We would like to advise that at the Grand Coulee powerplant an average output of 2,324 Mw was attained between 9.00 and 10.00 AM on Sept. 9, 1953. This output exceeds the nameplate rating of the generators by 350 Mw and exceeds the 2,100 Mw of the Kuibyshev hydro plant by 224 Mw.

Thus, on the basis of an hourly output of 2,324 Mwhr, and in the absence of any report from Russia to the contrary, the Grand Coulee powerplant can still claim the distinction of the highest output of any hydroelectric power development in the world.

Sincerely yours,
E. G. Nielsen,
Acting Commissioner
U. S. Dep't. of the Interior
Washington 25, D. C.

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Main Offices: 50 Paris Street, Newark 1, New Jersey

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Better Products to Control Electricity

Mr. W. H. Brown, right, reviews plans with Kuhlman salesman, Andrew H. Baxter.

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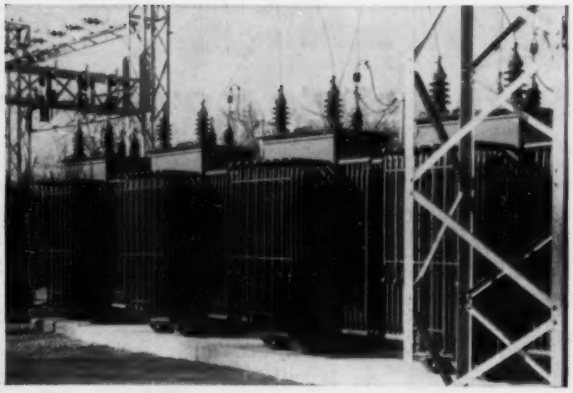

Doswell, Virginia looks ahead. When planning this four Kuhlman power transformer substation, approximately 50% reserve capacity was allowed for future growth.

"We particularly like the design of Kuhlman transformers," says W. H. Brown, Manager of the above installation at Doswell, Virginia.

"They are rugged in construction and generously provide all the features we consider important.

"We are also impressed with their height, which solves our problem of maintaining required ground clearances.

"Then, too, delivery was according to schedule which, in itself, is no little consideration."

This installation of three Kuhlman single phase power transformers, plus a spare, serves the growing rural and small industrial community of Doswell, Virginia. Although some of the load is polyphase, single phase units are used rather than three phase to give greater versatility for serving the system's single phase farm and residential lines.

Like Mr. Brown, you'll find Kuhlman small power transformers meet all your requirements —especially those features important to you.

KUHLMAN POWER TRANSFORMERS

KUHLMAN ELECTRIC COMPANY General Offices: Birmingham, Michigan

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